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CHAPTER 4

Cyclical Behavior of Wages

Cycles in Money Wages

GENERAL

UP TO now we have paid little systematic attention to the short-term movements which modified secular changes in wage levels at all times. Drastic fluctuations of that sort frequently occurred in connection with extraordinary episodes, such as the two world wars or the Great Inflation. Discussion of wage behavior under these abnormal circumstances will be reserved for Chapter 5. Here we shall be concerned with short-term changes in wage levels during the comparatively "normal" phases of German history.

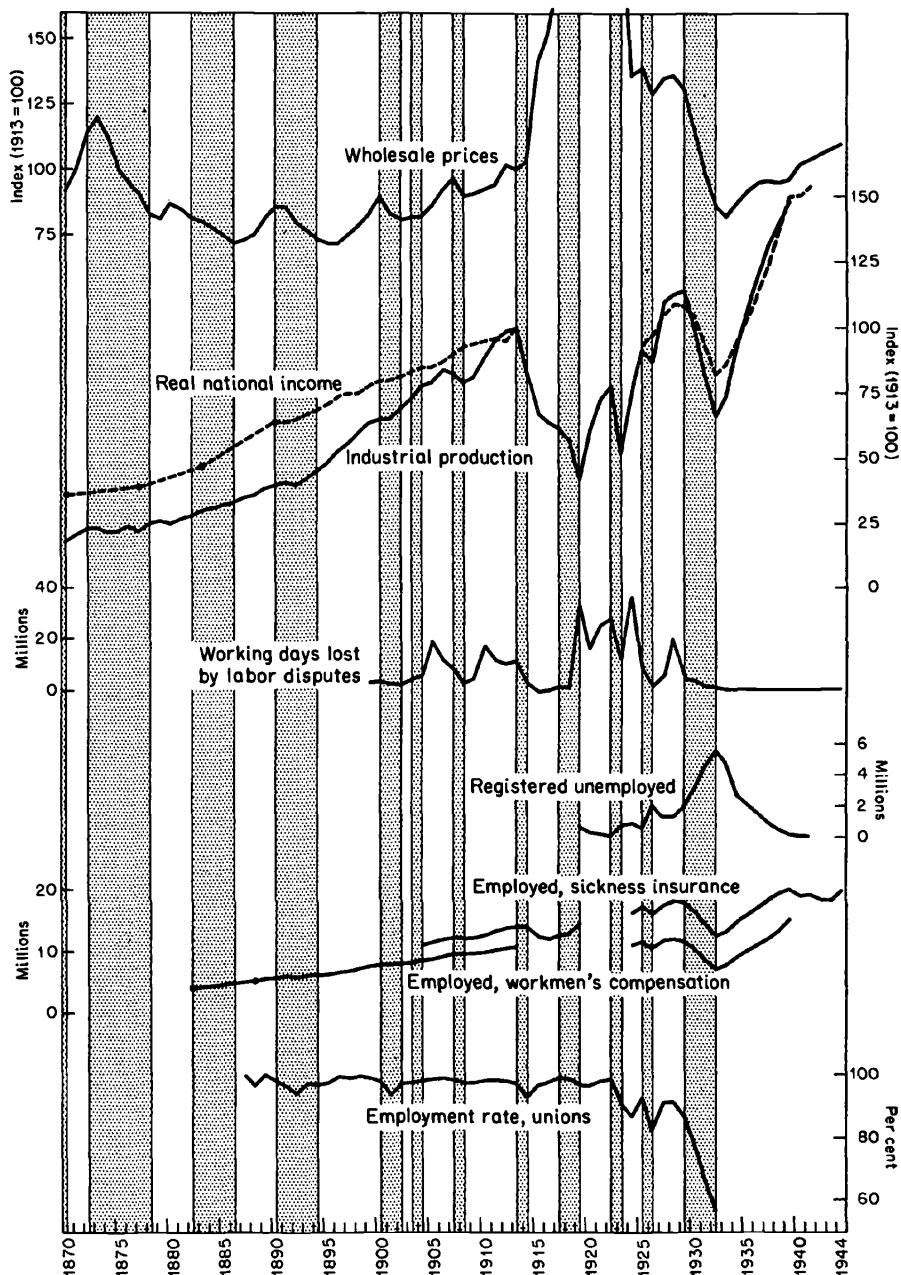
During the period 1870-1945 the German economy passed through twelve business cycles¹—including those during periods of inflation, war, and the years of National Socialism. If these unusual periods are omitted, we have eight and one-half business cycles occurring under comparatively ordinary circumstances. During these "normal" periods there were only two really dramatic cycles—the *Gründerjahre* boom and bust, and the cycle ending with the Great Depression. The *Gründerjahre* boom² was stimulated by the results of the victory in the Franco-Prussian War: annexation of Alsace and Lorraine, reparations payments from France, retirement of war bonds by the government, and—most important—general expectations of a great political and economic future for the Reich. The foundation of the Reich had also brought practically unrestricted freedom to found enterprises (only the incorporation of banks and railroads required a license), a federal commercial law, a uniform national currency, and an improved banking system. These conditions were conducive to the emergence of a large number of business ventures, industrial and financial. Railroad companies, mining and industrial enterprises, real estate and building concerns sprang up—frequently set up for wildly speculative and even fraudulent aims. Production, commodity prices, and stock quotations rose rapidly until 1873, when one of the sharpest and longest contractions in Germany's business history

¹ The reference chronology of the National Bureau includes turning points for eleven of these cycles, up to 1932. But the rise and fall of the German economy under National Socialism no doubt constitutes an additional cycle. The number of cycles remains the same, whether they are based on monthly or on annual data.

The National Bureau chronology is presented and compared with chronologies by Spiethoff, Clausen, and Wagemann in Appendix B. In this and later chapters, German business cycles (and their expansion and contraction phases) are identified in accordance with the reference chronology of the National Bureau.

² For a brief vivid description of the *Gründerjahre* cycle see Heinrich Bechtel, *Wirtschaftsgeschichte Deutschlands im 19. und 20. Jahrhundert* (München, 1956), pp. 183-88.

CHART II
Business and Labor Market Conditions, 1870-1944



Shaded areas represent business contractions.

Source: Appendix Table A-1.

occurred. There was an extraordinary wave of bankruptcies. The price decline was very steep—about a third for raw material and intermediate product prices. The production index of the IKF registered only a mild decline, although iron consumption is reported to have been cut by more than half, and contemporary and later historical studies describe “very considerable” and “widespread” unemployment.³ The other huge business cycle, lasting from 1926 to 1932, developed in a radically different climate, following as it did in the wake of a lost war. The expansion was characterized by relatively high levels of unemployment—which might, at least partly, reflect the short-term effects of a large-scale program of modernization and “rationalization,” furthered by long-term loans from abroad. The Great Depression was international in scope and complicated by mass unemployment and severe political repercussions. Compared with these upheavals, the other “normal” cycles were relatively mild and did not affect the economy to a similar extent (see Appendix Table A-1 and Chart 11).

For the purposes of a wage study the cyclical behavior of labor-market activities is of particular interest. A number of pertinent series—covering employment, unemployment, and labor strife—are included in the table and chart mentioned. To summarize their behavior in broadest terms: The selected indicators show that short-term changes in the labor market are closely associated with volume of production and business cycles at large. In the series bearing on physical output—labor input and degree of employment or unemployment—we find substantial differences in cyclical behavior before and after World War I. The interwar period brought higher unemployment levels and more violent cyclical swings. The difference in labor-market behavior before and after World War I corresponds to the break in industrial growth trends which is so decisive an aspect of German economic development.

This chapter will be concerned in detail with the effect of varying business conditions on the course of wages, but only incidentally with the effect of wage changes on the fortunes of the economy at large. However, since the broad economic implications of wage behavior will be touched upon occasionally, it is desirable to indicate the quantitative importance of wage payments in personal income fluctuations. Table 30 shows changes

³ *Der Arbeiterfreund* (Berlin, 1879), pp. 18 ff.; Willard L. Thorp, *Business Annals* (National Bureau of Economic Research, 1926), and Arthur A. Spiethoff, *Die Wirtschaftlichen Wechsellagen* (Tübingen, 1955), Vol. I, p. 124.

A mild decline in industrial production, in spite of a generally severe contraction, occurred also in the United States during these years. This might be related to the marked fall in prices and its effect on purchases. Rendigs Fels, explaining the mildness of volume reductions in the United States, argues that the high price flexibility at that time mitigated the decline of output (though prolonging the contraction phase of the cycle) and that the price depression stimulated exports and created a favorable balance of payment. See his “American Business Cycles, 1865-1879,” *American Economic Review*, June 1951, especially pp. 346 and 347. The circumstances cited—mild decline in production, sharp price breaks, and prolonged depression—are also characteristic of the German contraction.

TABLE 30
Total Personal Income, by Source, 1913 and 1925-1940
(billions of marks)

Year	Total Personal Income	Dividends and Interest	Rents	Proprietors' Income, Forestry and Agriculture	Proprietors' Income, Trade and Industry	Unemployment Insurance and Pensions	Wages and Salaries
1913	43.6	5.7	0.9	5.7	9.2	1.4	20.7
1925	57.6	1.2	0.5	5.7	10.9	5.6	33.7
1926	60.8	1.6	0.6	5.8	10.8	7.1	34.8
1927	67.1	2.1	0.8	5.9	12.0	7.4	38.9
1928	72.7	2.8	0.8	5.8	12.2	8.4	42.6
1929	73.6	3.3	0.9	5.5	11.8	9.2	43.0
1930	69.0	3.3	0.9	5.0	10.0	10.0	39.9
1931	59.4	3.2	0.9	4.4	7.5	10.1	33.4
1932	47.8	2.3	0.8	3.7	6.0	9.4	25.7
1933	47.9	2.4	0.7	3.9	6.4	8.5	26.0
1934	52.6	2.6	0.8	5.0	7.2	7.9	29.2
1935	57.9	2.6	0.8	5.8	8.5	7.9	32.3
1936	63.2	2.7	1.0	5.8	10.6	7.8	35.3
1937	69.7	2.8	1.1	6.1	13.3	7.6	38.9
1938	77.4	3.0	1.2	6.4	15.9	7.9	43.0
1939	85.8	3.0	1.3	6.9	17.9	10.2	46.4
1940	91.2	3.2	1.4	6.9	18.5	14.1	47.1

SOURCE: "Das deutsche Volkseinkommen vor und nach dem Kriege," *Einzelschriften zur Statistik des Deutschen Reichs*, No. 24 (1932), p. 83; *Jahrbuch* 1939-40, p. 579, and 1941-42, p. 605.

in total personal income and its major components for 1913 and for 1925-40. Wage-salary income during the interwar period is here seen to have accounted for more than half of total personal income in each of these years. The cyclical swings of labor income were roughly similar to those of total national income—wider than those in pension income and agricultural income, but shallower than those of profits in trade and industry. Table 31 contains a further breakdown of wage-salary income. It shows that wage income proper is only about half of total wage-salary income. This relation varies strongly with the business cycle, since salary income shows appreciably greater cyclical stability. While in 1929, for instance, 54 percent of the wage and salary total consisted of wages, this portion fell to 46 percent in 1932. Between 1929 and 1932 wage income was almost cut in half, while salary income decreased by only 30 percent. Fluctuations in the industrial payroll (manufacturing and mining) tended to be wider than those in the payroll covering all wage earners. During the reference contraction of 1929-32, for instance, the industrial payroll decreased by 59 percent—about ten percentage points more than the total wage bill.

These fluctuations in aggregate wage payments are caused to a large

TABLE 31
Total Wages and Salaries, 1929-1940
(billions of marks)

Year	Wages and Salaries (1)	Salaries (2)	Wages (3)	Payroll in Manufacturing and Mining (4)
1929	43.0	19.7	23.3	13.3
1930	39.9	18.7	21.2	n.a.
1931	33.4	16.7	16.7	n.a.
1932	25.7	13.8	11.9	5.4
1933	26.0	13.6	12.4	5.9
1934	29.2	14.3	14.9	8.0
1935	32.3	15.4	16.9	9.3
1936	35.3	16.5	18.8	10.6
1937	38.9	17.7	21.2	12.1
1938	43.0	19.3	23.7	13.6
1939	46.4	20.9	25.5	16.2
1940	47.1	22.1	25.0	15.7

SOURCE, by column:

(1 to 3) *Wirtschaft und Statistik*, 1939, p. 301; *Jahrbuch* 1939-40, p. 579, and 1941-42, pp. 605 ff.

(4) For 1929 and 1932, *Wirtschaft und Statistik*, 1939, p. 301; for 1933 to 1940, *Handbuch* 1928-44, p. 473.

extent by variations in total man-hours worked, which in turn reflect changes in employment and in average hours worked per week. During the 1929-32 contraction the decline in total man-hours was as large as 46 percent. Only a minor part of the variation in the wage bill is explained by fluctuations in earnings and in rates, which is one of the earnings components. It is with the cyclical behavior of rates and earnings of employed workers, particularly those attached to manufacturing and mining, that the following analysis is concerned.

Before we embark on the analysis itself, let us review the conceptual differences between rates and earnings.⁴ Wage rates, quoted on an hourly or weekly basis, are, in principle, the prices for work of defined character and skill during the given time period. Rates are typically quoted for "straight-time" work and are thus not affected by premium arrangements for overtime, night, and holiday work, or for high productivity. Nominal and effective wage rates must always be clearly distinguished. The former may be minimum rates, "prevailing" rates, union rates, or other wage quotations which serve as a limit or norm. Effective rates are always actually paid rates—as reflected in payroll or similar records. Piece rates are paid for defined operations or for entire parts and products. They

⁴ See also Daniel Creamer, *Behavior of Wage Rates During Business Cycles*, (Occasional Paper 34, National Bureau of Economic Research, 1950), pp. 2-4; and Paul H. Douglas, *Real Wages in the United States 1890-1926*, (Houghton Mifflin, 1930), pp. 6 ff.

are quoted per unit of operation or accepted product. Minimum standard piece rates assure the piece-rate worker of a floor under his efficiency wage.⁵

The collectively agreed-upon rates had different significance during different time periods. At the beginning of our period they were usually the highest paid in each trade—covering only a relatively small number of organized, and generally highly paid, workers. During the Weimar Republic they covered practically all workers, and being regarded as minimum rates, they were generally exceeded by actually paid rates. Direct comparison of nominal rates in the nineteenth and twentieth centuries might thus somewhat understate the changes in effective rates. The quoted rates, in any case, can be regarded as “list prices” only, not as “effective prices.” Furthermore, to derive effective labor costs per hour to the employer, modifying factors such as incidence and rate of premium payments must be considered.

Both time and piece rates are, of course, basic elements in the determination of earnings. Among the additional elements affecting earnings are the rates for, and the relative importance of, premium work, the actual output of piece workers, production and other bonuses, and the number of hours worked. The latter affects daily earnings, shift earnings⁶ and weekly earnings directly and indirectly (via premium payments), hourly earnings only indirectly.

Earnings, as commonly ascertained, are often affected by additional variables. Typically, average earnings are derived as quotients of aggregate payroll and total hours, shifts, or weeks worked during the payroll period. In these cases, changes in the composition of the work force and of the hours worked will affect the resultant earnings whenever no statistical standardization of the composition is provided. Without standardization average hourly and weekly earnings may be affected by changes in skill, age, and sex composition of the work force, changes in the quantitative importance of inexperienced labor as compared with experienced, and by changes in the proportion of single and married workers and of workers in different types of industries, cities, and regions. Weekly earnings, furthermore, may be influenced by a changing importance of part-time work, particularly if no clear distinction is made between fully and partially employed

⁵ Piece rates will not be analyzed *per se* in subsequent discussions, but they enter into the derivation of some union rates and of average hourly and weekly earnings. For the union rates available during the period of the Weimar Republic and later, so-called *Akkordrichtsätze* (standard rates for piece work) are included in the rate averages. These were minimum standards for expected average earnings resulting from piece rates and were usually set at 15 percent above comparable time rates. On the nature of the minimum time and standard piece rates agreed to in the collective contracts of the Weimar Republic, see notes to Appendix Table A-2, Part III.

⁶ Shift earnings play a large part in German wage analysis, since one of the most important collections of German earnings statistics, miners' earnings, is published in this form. In German coal mines, shift earnings for surface workers were mostly based on time rates. In underground operations the so-called *Gedingelohn* prevailed, a system in which remuneration of the miner was, to a large extent, based on group performance.

persons. Some of the effects of changing composition of the work force and of changes in number of hours worked may, of course, be excluded if average earnings are computed separately for men and women, skilled and unskilled, and similar categories. Such standardized earnings data for broad groups (skill, sex, and industry) are available for the last few years of the Reich. For earlier periods the best way to exclude the effects of changing composition is to select sufficiently small, occupationally well-defined groups.

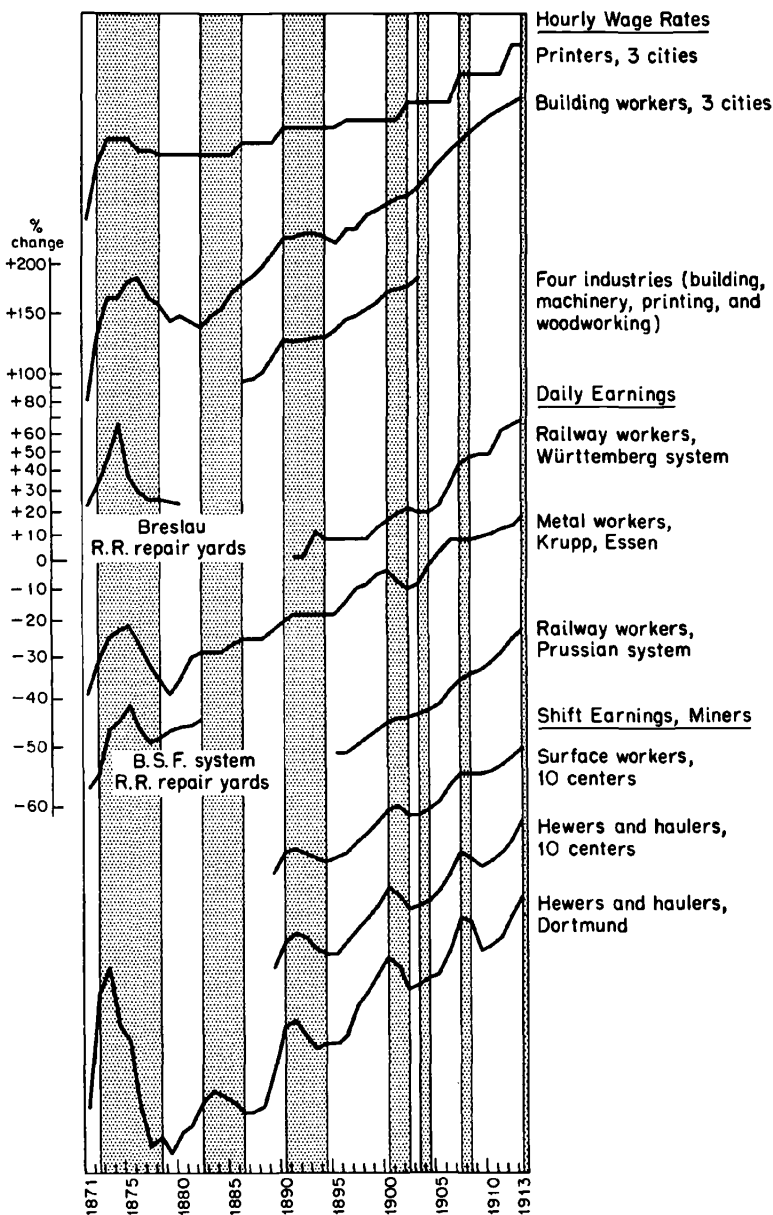
Many of the wage series depicted in Charts 2 to 5 and Chart 12 show recurrent ups and downs which correspond roughly to business cycle expansion and contraction periods—an indication that wages respond to cyclical changes in general business activity. However, even casual inspection of these charts reveals that the actual relation of short-term wage fluctuations and business cycles was far from regular or simple. Frequently annual changes in wages appeared to be rather independent of cycles in general business conditions. This was true not only for contractions in periods of rapid monetary depreciation, such as 1917-19 or 1922-23, but also for some of the briefer "normal" contractions, for example 1903-4, to which our wage series showed little or no perceptible response. In particular, wage rates failed to show—over extended periods of time—genuine cycles (with rises and actual declines) despite fluctuations in general business conditions. Thus it is necessary first to establish whether wage rates and earnings did in fact respond to changes in general business conditions, and if so, with what degree of regularity and under what circumstances. Only then may we ask how promptly they responded, how strongly, and in what cyclical patterns.

WAGES AND TURNING POINTS IN BUSINESS CONDITIONS

Conformity of Wage Cycles

WAGE RATES AND BUSINESS CYCLES. There is no doubt that German wage rates showed true cyclical behavior during the *Gründerjahre* cycle of 1870-78, and during the major business cycle of 1926-32. This appears from the hourly and weekly printing and building rates depicted in Charts 3 and 6 as well as from the average rates for all industry (1924-32) in the latter chart. In the cycles cited, even these rough annual data show substantial increases and declines which can easily be related to cyclical changes in business conditions. We can go no further, however, in finding examples of full cycles, with actual ups and downs, of wage rates in the annual record of the long-term series mentioned. It is true that in some instances wage rates undergo changes in their rate of growth, or a leveling-out into plateaus, which may be related to cycles in general business conditions. In building rates prior to World War I, for example, a combination of leveling-off and brief decline matches the 1890-94 contraction in general business conditions; and the retardation of growth during 1900-2 corresponds to the business contraction of the same years. Again, the

CHART 12
Wage Rates and Earnings in Selected Industries, 1871-1913



Shaded areas represent business contractions.

Source: Tables 33 and 36, and Appendix Tables A-3 to A-8.

comprehensive interwar series of union rates shows during the mid-1920's a slight retardation in its rise which might be regarded as a response to the business contraction of 1925-26. But in other instances wage rates do not indicate any observable responses to changing business conditions. Thus, in following the course of rates in building, we can find no reflection of the contractions of 1882-86, 1903-4,⁷ and 1907-8. Instead, we note that throughout these contractions building rates increased at an undiminished pace, and that between 1878 and 1882 they declined during a business expansion. Nor can we observe a correspondence in the case of printing rates before World War I: here it is virtually impossible to match the leveling-out stages of the rates to contractions in business cycles.⁸

The sporadic nature of the conformity of wage rates to business cycles is observable in the summary measures presented in Appendix Table A-20, based on hourly and weekly wage rates in selected industries as well as on comprehensive hourly rates from 1924 to 1932. Average annual changes of cycle relatives are shown for each reference expansion and contraction during the years 1871-1913 and 1924-32.⁹ In all rate series the only substantial declines occurred during the Great Depression. The actual declines following the *Gründerjahre* expansion do not show up in these reference measures because of the difference in timing between wage cycles and reference cycles. The conformity of wage rates is summarized by the measures¹⁰ given in Table 32. These indexes show high average conformity during expansions and negative conformity during contractions. Over the cycle as a whole, a low positive conformity appears in all except hourly union rates for printers.¹¹

⁷ The 1903-4 contraction, although included in the chronology of the National Bureau, is somewhat dubious (see Arthur F. Burns and Wesley C. Mitchell, *Measuring Business Cycles*, National Bureau of Economic Research, 1946, p. 133). The contraction is not recognized by Spiethoff (see Appendix Table B-1).

⁸ The response of wage rates to business cycles is here examined largely in terms of behavior during reference contractions, since in periods of long-term growth, trend and cycle elements can hardly be distinguished in expansion phases. In such growth periods, wage decreases during business contractions, on the other hand, constitute *prima facie* evidence of cyclical response.

⁹ Cycle relatives describe the standing of a series expressed in percent of the average of that series during each cycle. Average annual changes during contractions and expansions are computed as differences between cycle relatives at turning points, divided by number of years between turning points.

¹⁰ Conformity indexes range between +100 (perfect positive conformity) and -100 (perfect inverse conformity). For a short description of the meaning of these indexes see note to Appendix Table A-20. A detailed explanation will be found in Burns and Mitchell, *op. cit.*, pp. 176 ff. The indexes used here do not take account of systematic differences between the timing of the series and business cycles; that is, they are all computed from changes between peak and trough years of business cycles. Because of the tendency of wage rates to lag, this may result in an understatement of the degree of relationship between wage rates and business cycles.

¹¹ Nationwide rate agreements for printers were valid over long periods, sometimes as long as eight years. Although the substance of the agreements may have been affected by the state of business at the time they were concluded, the printing rates before World War I were not sufficiently flexible to reflect short-term fluctuations in general business activity with any regularity.

TABLE 32
Indexes of Conformity, Wage Rates, Annual Series, 1871-1932

Series	CYCLES COVERED		INDEXES OF CONFORMITY		
	Number	Years	Expansions	Contractions	Full Cycles
<i>Union Rates</i>					
Hourly rates					
Comprehensive series	2	1923-32	+100	0	+33
Printing	8½	1871-1913, 1923-32	+78	-50	-13
Building	8½	1871-1913, 1923-32	+78	-50	+33
Weekly rates					
Printing	8½	1871-1913, 1923-32	+78	-38	+27
Building	8	1871-1913, 1923-32	+78	-86	+14
<i>Effective Hourly Rates</i>					
Printing	2	1890-1903	+100	-100	+33
Building	2½	1886-1903	+100	-100	+100
Machinery	2½	1886-1903	+100	+100	+100
Woodworking	2	1890-1903	+100	-100	+67

SOURCE: Appendix Table A-20.

The evidence introduced for the years up to World War I shows the existence of full wage-rate cycles only during a single, rather exceptional, period—the *Gründerjahre*. The cyclical response of wage rates is doubtful during less pronounced cycles. Thus it cannot be ascertained, from the long-term series of building and printing rates, whether changes in German wage rates before World War I typically bore distinct relations to business cycles. In order to resolve the question on the basis of more adequate information, composite indexes of actually paid hourly wage rates covering the years 1886-1903 were constructed from six printing industry series, seven machinery industry series, ten building series, and seven wood industry series, which were available in a sufficiently comparable form for the greater part of the period.¹² Table 33 and Chart 13 show the resultant index numbers for the four industries, with 1890-99 as the base period. Average annual changes of cycle relatives and conformity measures are included in Appendix Table A-20 and Table 32. They indicate clearly that in the two contractions covered, 1890-94 and 1900-1902, there occurred either a small actual decline (machinery industry, averaging about 2 percent per year) or an increase smaller than that during the adjoining expansions.¹³ Over the average of all expansions covered by the four series,

¹² The basic series for this sample were taken from Robert R. Kuczynski, *Arbeitslohn und Arbeitszeit in Europa und Amerika, 1870-1909* (Berlin, 1913). The rates are "effective" or actually paid rates, not "nominal" rates, or union rates.

¹³ The single exception is the behavior of printing rates during the 1900-2 contraction; here the average percentage increase is larger than in the preceding expansion, although smaller than in the subsequent expansion.

TABLE 33
Effective Hourly Wage Rates, Four Industries, 1886-1903
(1890-99 = 100)

Year	Building	Machinery	Printing	Woodworking	Average of Four Industries
1886	84.8	78.0	...	...	82.1 ^a
1887	84.5	79.9	...	...	82.6 ^a
1888	85.5	82.3	84.8	...	84.6 ^a
1889	91.3	88.7	86.0	91.4	89.4
1890	95.7	100.3	90.5	94.3	95.2
1891	96.6	99.4	91.5	91.9	94.8
1892	97.0	96.9	95.7	93.6	95.8
1893	97.3	95.4	97.5	94.3	96.1
1894	96.2	94.1	97.2	97.9	96.4
1895	97.6	98.7	100.8	97.0	98.5
1896	101.3	103.9	102.8	104.3	103.1
1897	103.1	100.1	107.5	105.9	104.2
1898	106.7	104.0	107.0	109.1	106.7
1899	108.9	106.9	109.5	111.6	109.2
1900	112.8	112.1	111.0	120.7	114.2
1901	115.1	110.0	112.2	123.7	115.2
1902	114.8	108.6	117.2	123.9	116.1
1903	118.9	113.3	122.7	125.6	120.1

^a For 1886-88, computed by linking percentage changes in available industries.

Based on data from Robert R. Kuczynski, *Arbeitslohn und Arbeitszeit in Europa und Amerika, 1870-1909* (Berlin, 1913).

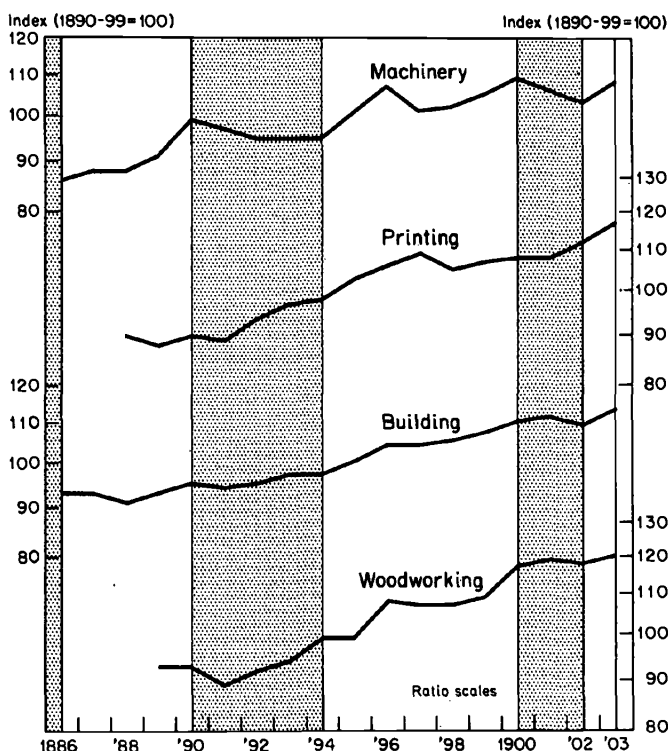
the annual increase of cycle relatives was 3.5 percentage points; the corresponding increase for contractions was 0.5 points. The conformity shown by these effective rates is somewhat more pronounced than that of the union rates for printers and building workers. We find, moreover, high positive conformity of actually paid rates in the machinery and woodworking industries, for which no comparable union rates are available.

To sum up what can be said about conformity of wage rates prior to World War I: Only during the *Gründerjahre* does cyclical conformity appear in the form of clear changes of direction, corresponding to the ups and downs of business. In some pre-1913 contractions, wage rates responded to changes in general business by retardations in the rate of increase. Even such retardations cannot be regularly observed during some shorter contractions. Actually paid or effective rates tended to show clearer conformity than nominal rates.

For cycles following World War I, the degree of conformity of wage rates can be established on the basis of monthly evidence (see Table 34

and Chart 14). The response of union wage rates to the 1926-32 cycle is, of course, the most striking feature of the chart. However, the monthly data reveal also a general leveling-out of wage rates toward the end of 1925, and even small actual declines in rates during the summer of 1926. There are good reasons for relating this leveling-out or decline to the general business contraction of March 1925 to March 1926. First, actual

CHART 13
Effective Hourly Wage Rates, Four Industries, 1886-1903



Shaded areas represent business contractions.

Source: Table 33.

declines, in excess of those shown in the average, occur in several industries (building, woodworking, and others; see Chart 15 and Appendix Table A-21). Second, during this period wage contracts in some industries expired without being renewed, and it is known that collectors of wage statistics tended to assume that wage rates continued to be paid at the level of the expired contracts, although lower rates may actually have been paid. Finally, the fact that the leveling-out of wage rates started only eight months after the peak in business conditions is compatible with the characteristic lag in these rates, which will be discussed later in detail.

Appendix Table A-22 shows the behavior of ten wage series on a

reference cycle basis. The specific rate declines in response to the March 1925–March 1926 recession occurred only after that reference cycle phase. As a consequence, wage rates during the reference contraction increased more than during the subsequent expansion. This situation, in spite of perfect conformity in all other reference cycle phases, limited the over-all conformity for the interwar period to +33. The conformity would be perfect if allowance were made for differences in timing.¹⁴

TABLE 34
Hourly Union Rates, by Months, 1924-1933
(1928 = 100)

Month	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933
Jan.	56.7	72.5	86.7	87.4	95.7	103.1	107.1	106.7	88.8	84.2
Feb.	56.0	73.3	86.8	87.5	95.8	103.2	107.1	105.3	88.8	84.1
Mar.	55.4	75.2	86.8	88.2	96.3	103.4	107.1	104.2	88.6	83.6
Apr.	59.2	77.0	86.7	89.9	98.5	104.0	107.3	102.1	88.6	83.6
May	63.4	78.8	86.7	92.9	100.5	105.7	107.4	101.3	86.5	83.6
June	66.2	80.7	86.4	93.5	100.6	106.1	107.4	101.1	85.3	83.5
July	66.4	81.8	86.5	93.5	100.9	106.3	107.4	101.0	85.2	83.5
Aug.	66.7	83.5	86.5	93.6	101.6	106.6	107.4	100.9	85.1	83.5
Sept.	66.8	84.4	87.3	93.7	101.6	106.6	107.4	100.8	84.6	83.5
Oct.	67.9	85.1	87.2	94.6	102.6	106.7	107.4	100.1	84.3	83.5
Nov.	69.7	86.3	87.3	95.1	102.7	106.8	107.4	99.5	84.3	83.5
Dec.	71.6	86.4	87.4	95.2	103.0	107.1	107.3	98.8	84.2	83.5

This index combines the revised union rate statistics (available from 1928 on) with earlier, unrevised, figures. The linking of the segment 1925-27 to the later segment was carried through by the Statistische Reichsamt (see *Reichsarbeitsblatt* 1931, Part II, p. 109). In the present study the index was pushed back one more year (1924), on the basis of the average of skilled and unskilled male workers, with the weights 1.0 and 2.2, respectively. These weights, based on employment (*Vierteljahrshefte zur Statistik des Deutschen Reichs*, 1931, p. 97), are those used by the Statistische Reichsamt in the revised index. For a description of the nature of these rates see notes to Appendix Table A-2, Part III. SOURCE: *Reichsarbeitsblatt*, 1931, Part II, p. 109; 1933, Part II, p. 44; 1934, Part II, p. 91. Monthly data for 1924 estimated, in the present study, on the basis of wage rates for male workers (skilled and unskilled) as published in *Jahrbuch* 1926, p. 291.

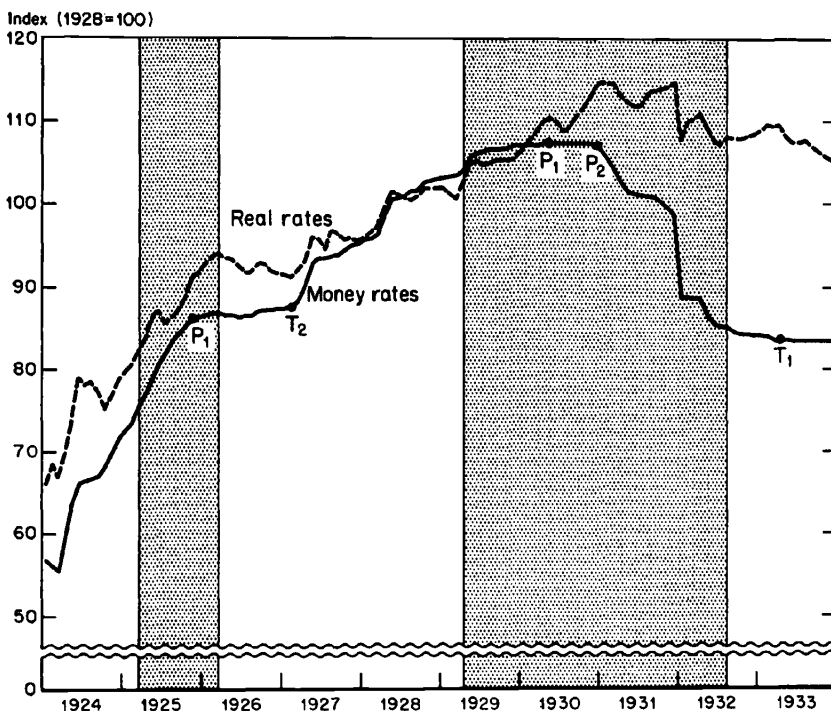
EARNINGS AND BUSINESS CYCLES. A closer relation is observable for earnings and business cycles than for rates. The comprehensive hourly and weekly earnings series depicted in Chart 2 show that during the years 1924-44 all major business cycles are clearly reflected. The short 1925-26 contraction leads only to a deceleration in the rate of growth, but in the other phases earnings actually rise and fall with general expansions and

¹⁴ The above observations refer to the aggregate rate measure. Appendix Table A-22 gives also industrial detail. The individual series show strikingly similar behavior. Conformity indexes during the interwar period are the same for each of the included series: +100 for expansions, 0 for contractions, and +33 for full cycles. If differences in timing were taken into account, each of the ten presented series would show perfect conformity.

contractions in business.¹⁵ Thus, conformity for the postwar period is perfect (+100).

Tolerably good positive correspondence between earnings cycles and business cycles can be found also during the period before World War I (See Chart 12, Appendix Table A-23, and Table 35). Average daily earnings of workers in Krupp's iron works,¹⁶ for instance, show distinct

CHART 14
Average Hourly Money and Real Wage Rates, 17 Industries, 1924-1933



Shaded areas represent business contractions.

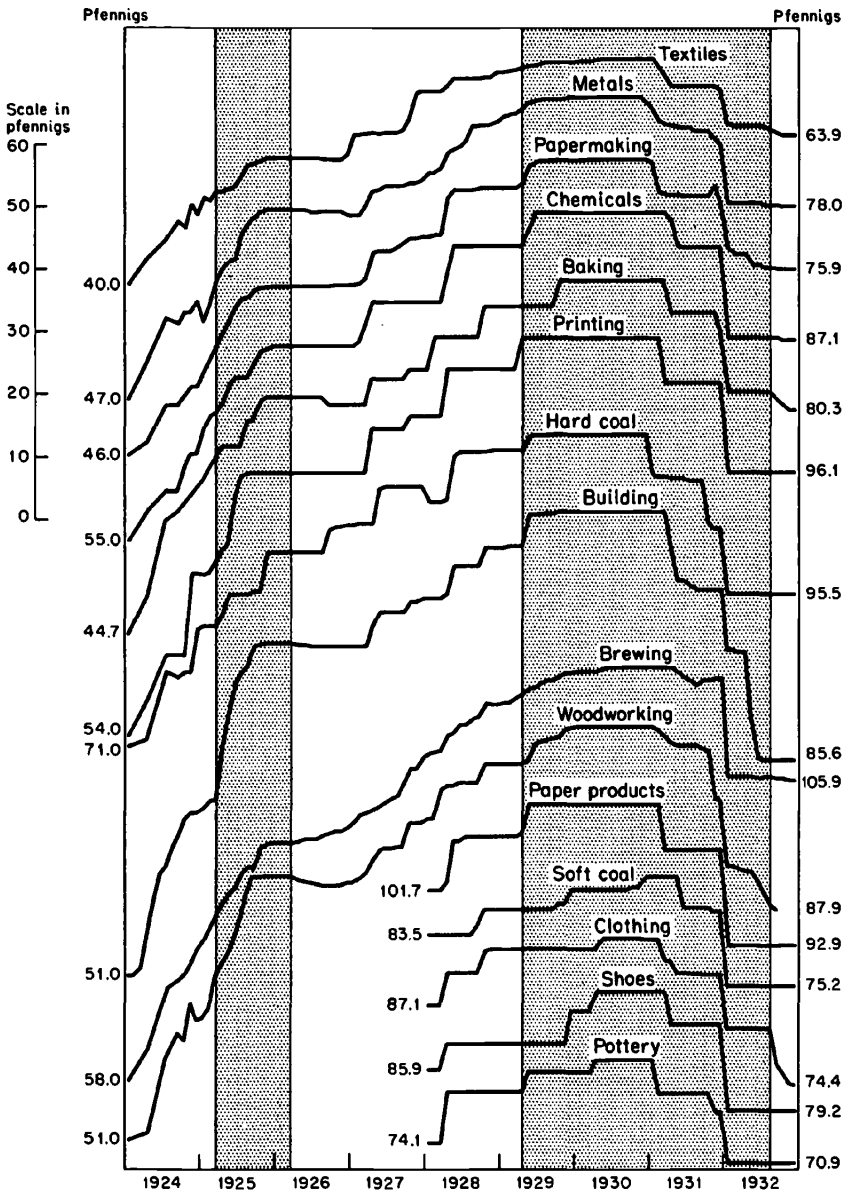
Source: Tables 34 and 44.

cyclical movements, which in most instances can be quite clearly related to corresponding phases in business activity. In all contractions except the somewhat dubious one of 1903-4, earnings of Krupp workers declined or rose less than in the adjacent expansions. Conformity for the prewar period is measured as +67. In the case of daily earnings in railway repair yards, a fair degree of conformity can also be demonstrated.

¹⁵ The position of 1926 had to be read from a graph, and 1927 was then interpolated on the basis of the movement of hourly rates.

¹⁶ The Krupp data are annual, based on payroll divided by number of workers. The firm grew rapidly, and the average earnings data reflect major changes in composition.

CHART 15
Union Wage Rates of Skilled Men, 15 Industries, 1924-1932



Shaded areas represent business contractions.

Source: Appendix Table A-21.

TABLE 35
Indexes of Conformity, Earnings, Annual Series, 1871-1932

Series	CYCLES COVERED		INDEXES OF CONFORMITY		
	Number	Years	Expansions	Contractions	Full Cycles
<i>Hourly Earnings</i>					
Comprehensive series	2	1923-32	+100	0	+100
<i>Daily Earnings</i>					
Krupp, Essen	6½	1871-1913	+100	-17	+67
<i>Weekly Earnings</i>					
Comprehensive series	8½	1871-1913, 1923-32	+89	+12	+73
<i>Miners' Shift Earnings</i>					
Below ground:					
Hard coal, Upper Silesia	6	1890-1913, 1923-32	+100	-33	+90
Hard coal, Lower Silesia	6	1890-1913, 1923-32	+100	0	+60
Hard coal, Dortmund	8½	1871-1913, 1923-32	+100	+50	+73
Hard coal, Saar District	4	1890-1913	+100	0	+71
Hard coal, Aachen	6	1890-1913, 1923-32	+100	+33	+60
Lignite, Halle	6	1890-1913, 1923-32	+100	+33	+80
Salt, Halle	6	1890-1913, 1923-32	+100	0	+80
Ore, Halle	6	1890-1913, 1923-32	+100	+33	+60
Ore, Upper Harz	5½	1890-1913, 1923-32	+100	-67	-33
Ore, Siegen-Nassau	6	1890-1913, 1923-32	+100	+33	+100
Ten centers	6	1890-1913, 1923-32	+100	+33	+80
Above ground:					
Hard coal, Dortmund	7½	1878-1913, 1923-32	+100	-14	+62
Ten centers	6	1890-1913, 1923-32	+100	+17	+80

SOURCE: Appendix Table A-23.

Still closer is the correspondence of miners' earnings to changes in general business conditions. In fact, specific cycles in miners' earnings can generally be matched with reference cycles. There are, however, three major exceptions. One is the mild reference contraction of 1903-4 which is skipped by underground miners' earnings in every district. The second is the contraction of 1925-26 in which miners' earnings showed no actual declines, but rather experienced in every district a marked deceleration of growth as compared to the preceding expansion year.¹⁷ The third exception refers to the state-controlled ore mines in the Upper Harz. The generally high degree of association between cycles in miners' earnings and those in general business conditions does not imply that miners'

¹⁷ The cyclical significance of this deceleration is not certain. Earnings increases between 1924 and 1925 still showed some effects of the poststabilization adjustment. Furthermore, the rates of increase during the 1925-26 depression are not set off from those in the subsequent expansion years.

earnings always declined during reference contractions. Because of lags in timing, the earnings sometimes underwent cyclical responses only after the reference contraction had run its course. Such a situation prevailed in the hard coal mines of Silesia and the Saar during and after the reference contraction of 1907-08. In other cases the actual declines occurred only in certain years during the reference contractions without resulting in a net decline between turning points or in an average annual decline during the reference contractions as a whole (i.e., hard coal mining in Upper Silesia and salt mining in Halle during the reference contraction of 1890-94). The conformity indexes for these earnings series typically range between +60 and +100, with only government-owned ore mines in the Upper Harz showing negative conformity.¹⁸

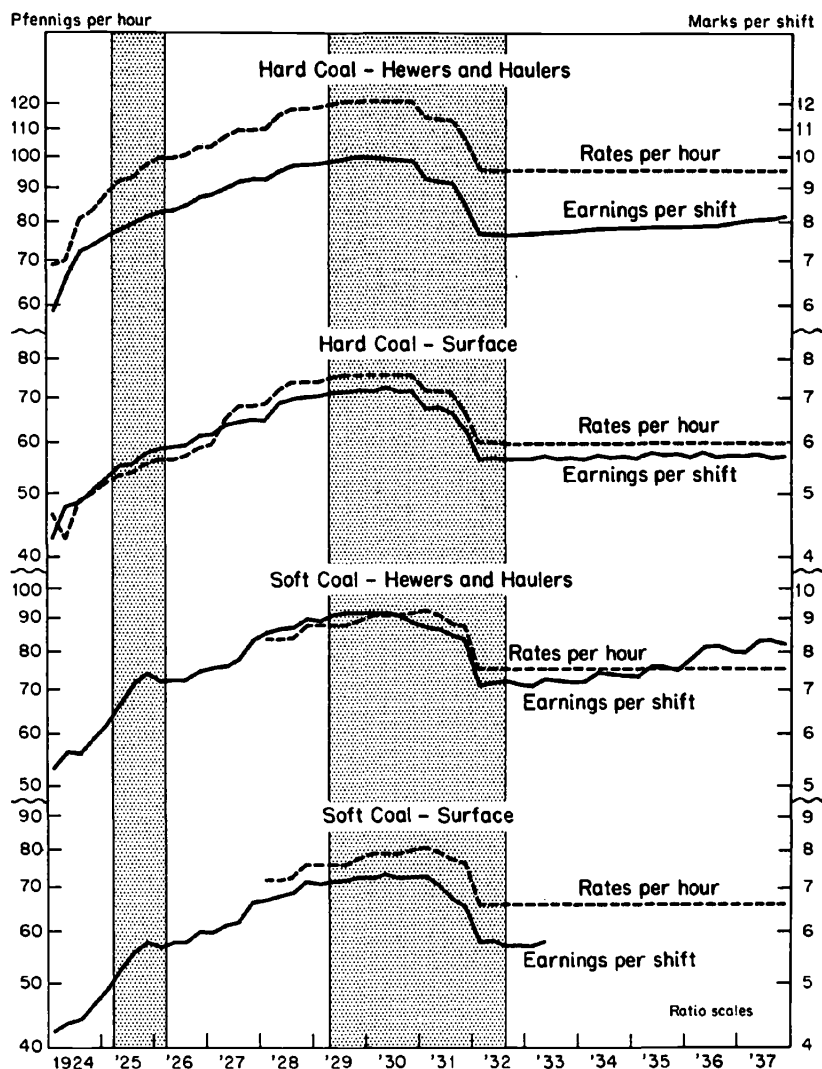
All in all, earnings conform more closely than wage rates to business cycles, both by showing less tendency to skip cycles and by clearer and more frequent actual declines during business contractions. The basic reason is that the factors which differentiate earnings from rates, particularly those having to do directly or indirectly with hours worked, are positively related to business activity. If business conditions improve, employment rises, the workweek lengthens, and overtime, night, and holiday premium pay is more frequent. Conversely, in times of declining business activity, these elements tend to shrink. It is true that some factors in the earnings picture may be countercyclical in character. The attempt to preserve a skeleton staff of experienced workers in times of unemployment might, for instance, affect the skill composition of the remaining work force in the direction of a greater percentage of higher skills. But these cyclically dampening influences are doubtless the less effective ones. In the German experience they are not only obscured by the effects of hours and premium payments, but also, during prosperous times, by the excess of rates actually paid over the established minimum rates.

The Lag of Wages behind Cyclical Turns

WAGE RATES. To establish the relation of cyclical turns in wage rates to those in general business, monthly and quarterly data would of course be desirable. Unfortunately, for the period prior to 1913 the best available data are annual. Even they, rough as they are, suggest one of the most outstanding features of the behavior of wage rates: their distinct lag

¹⁸ The above measures are based on annual series. From 1889 and throughout the later years, miners' earnings for ten districts are available, or can be derived, in quarterly form. Effects of the 1903-4 reference contraction, which were not reflected in the annual averages, can be detected in the more detailed quarterly earnings record which was compiled for five districts (see Appendix Table A-24). Similarly a flattening out in response to the 1925-26 contraction can be observed in quarterly earnings of coal miners for the Reich as a whole (see Appendix Table A-25 and Chart 16), while no such response is apparent in the annual records. Conformity indexes were constructed for six quarterly series during the years 1890-1913 and 1924-32 (see Appendix Table A-26). These measures indicate a degree of conformity similar to that observed on the basis of the annual information.

CHART 16
Wage Rates and Earnings of Coal Miners, Reich Area, 1924-1937



Shaded areas represent business contractions, in terms of monthly chronology.

Source: Appendix Table A-25

behind turning points in general business conditions. As indicated in Charts 3 and 12, during the *Gründerjahre* printing rates began to decline only after 1875, and the peak of building wages was reached in 1876.¹⁹ Measured against the turning point established by the National Bureau, 1872, the lag amounts to at least three years. Although this dating of the turn in business conditions seems early to the present writer,²⁰ even a shift of the reference turn to 1873 would still leave the wage rates lagging materially. Examination of the wage rates for building during the first decade of the Reich's history also creates the impression of lags. While it is difficult to match cycle phases of wage rates and general business activity during the 1880's, in subsequent decades further evidence of lags in rates is found. The upper turn of rates in building, for instance, occurs two years after the reference peak of 1890, and the slight subsequent trough one year after the reference turn of 1894.²¹ Even the mild trend modification around 1900-1902 shows a one-year lag at the 1900 peak and coincidence at the trough.²² Proper matching of cycle phases becomes possible again only for the interwar period, particularly in relation to the 1929 and 1932 reference turns. On an annual basis, hourly wage rates in printing and building, as well as every other series included in the comprehensive wage-rates index, reach their peaks one year after the 1929 turn in general business conditions. And, after the Great Depression had run its course, wage rates for all industry continued to decline materially for a year after the lower turn in general business conditions was passed.

The general impression of a substantial lag of wage rates behind reference turns can be verified and the extent of the lag more adequately determined on the basis of the monthly union rates published for the period 1924-44. Before proceeding to such measurement, however, we must note a peculiarity in the behavior of union wage rates. Inspection of Chart 15 shows that the cyclical responses of wage rates deviate from the known behavior of the majority of economic activities. The deviation consists in the step-function character of the rate series, with their long maintenance of horizontal movements—whether in the form of high

¹⁹ Contemporary observers mention the latter year as marking the decline of "wages." Victor Böhmert describes wage developments during the *Gründerjahre* in relation to general business activity. He recounts how, after the Frankfurt peace, a rush into capital investments started. The extraordinary demand for labor boosted wages in some enterprises by 50 to 100 percent. Only from 1876 on—according to Böhmert—could one note decreases in wages, leading to a wage trough in 1879. From that point a slow improvement set in. See "Statistik des Arbeitslohns," *Handwörterbuch der Staatswissenschaften*, 1890 ed. Vol. 1, p. 707.

²⁰ Also Spiethoff, Thorp, and Jerome regard 1873 as the peak year. See Appendix Table B-1 for Spiethoff's chronology. See also Thorp, *op. cit.*, p. 207, and Harry Jerome, *Migration and Business Cycles*, pp. 174-75 (National Bureau of Economic Research, 1926).

²¹ No adequate data are available for the prewar period to compare the timing of building wage rates with that of building activity.

²² The composite indexes of actually paid wage rates for four industries presented in Table 33 and Chart 13 are inconclusive with regard to timing. The machinery series, however, is coincident at all four turns.

plateaus close to business cycle peaks, of flat bottoms close to business cycle troughs, or of intermediate planes representing interruption of growth in response to declines in business activity. Such behavior leads to difficulties in the identification of cyclical responses, and requires special descriptive measures which will permit us to relate both edges of the plateaus to turning points in general business or in employment.²³ For this purpose a distinction is made henceforth between the initial (P_1) and terminal (P_2) edges of the high ridges, the corresponding points (T_1 and T_2) of the flat valleys, and the edges (P_1 and T_2) of intermediate plateaus in a rising trend. The above terms and symbols will be helpful in subsequent description of the cyclical behavior of rates.²⁴

Average hourly union rates of all industry are found in Table 34 and Chart 14. The reaction of average wage rate levels to the 1925-26 contraction occurred in the form of a leveling-out, starting close to the end of 1925 and ending at the beginning of 1927. If the edges of the plateau are taken to represent the beginning (P_1) and end (T_2) of the reaction to the reference contraction, the delay in such reaction should be stated as eight months behind the peak of general business activity, and eleven months behind the trough. After the latter upturn, wage rates proceeded to rise during the prosperous years of the late 1920's. Business conditions began to worsen in April 1929. Wage rates, however, continued to advance moderately for one more year, reaching a plateau in May 1930²⁵ (P_1), and maintaining peak levels to the end of that year. They did not start to decline until December 1930 (P_2), that is, twenty months after the downturn in general business conditions.²⁶ A rather pronounced lag in the reaction of wage rates to changes in general business conditions can be observed after the business cycle trough of August 1932. Average union rates continued to decline after that date for about seven more months. No single lower turning point can be established because wage rates

²³ The National Bureau's standard rules on timing are not especially suited to describe the cyclical behavior of step functions in general or that of German wage rates in particular. The Bureau's rules designate the highest monthly values or the center of the highest three-month average as the turning point. In the case of a high ridge or flat trough, the last observation on the plateau level is regarded as the turning point. This procedure fails to delineate the initial edges of the plateau, which indicate the cyclically important cessation of growth or decline. Moreover, if the essential character of a series is that of a step function, the cyclical description should be based on the location of steps and plateaus rather than on small temporary elevations or turning points created by minor changes in the level of the plateau.

²⁴ For minor cycles in business activity, Creamer also determined turning points of wage rates at the beginning or at the end of plateaus (Creamer, *op. cit.* pp. 6 ff.). However, Creamer chose a technique differing from that employed in this study.

²⁵ Although the average of all wage rates showed only a mild rise after December 1929, rates in four of the seventeen industries included in the average increased substantially after that date, and no series declined. In May 1930, however, rates for skilled workers had reached their high in all industries except soft coal (see Chart 15). In view of these considerations, May 1930 rather than December 1929 is here regarded as the initial edge of the wage plateau.

²⁶ The peak of wage rates occurred also with a pronounced lag behind the peaks of employment, of man-hours, and of industrial production.

after the spring of 1933 (T_1) were kept virtually stable until about the beginning of World War II (T_2).

The response of wage rates came with appreciable delay after each reference turn. The extent of the lags depends on the type of measure used. If the first signs of cyclical response, even in the form of reaching or leaving plateaus, are used as benchmarks, the observed lags were between seven and thirteen months. If only actual reversals in direction and ends of plateaus are regarded as specific turning points, the evidence would show only one clear lag, of nineteen or twenty months after the April 1929 peak, and a long lag of unspecified duration after the August 1932 trough. However defined, the wage-rate lags during the Weimar Republic ranged between seven and twenty months; these are not incompatible with the lag of about one year suggested by the annual information for the years prior to 1913, as discussed above.

The lag of the monthly wage-rate index for all industry can be observed in every single component industry, see Appendix Table A-21 and Chart 15. Furthermore, the concentration of turning points in industry rates is fairly strong. After the 1929 peak, for instance, ten out of eighteen industries maintained their peak levels through the first three months of 1931. Wage rates of metal workers and clothing workers had their turning points (P_2) as early as November 1930, and soft coal miners as late as May 1931. Thus, after the 1929 reference peak, the quoted lag in the decline of average rates (P_2) was a minimum lag, reflecting the early wage-rate decline in two industries, metals and clothing. In other industries the lag was longer—sometimes as much as two years.

EARNINGS. Average earnings exhibit less tendency to lag than wage rates, as has already been suggested by information for the *Gründerjahre* cycle. The peak in wage rates occurred about 1875—three years after the reference turning point of 1872 as determined by the National Bureau. The available earnings information is sporadic and not directly comparable to the rate data. However, of the ten earnings series assembled in Table 36, only three show peaks in 1875, three in 1874, and the rest in 1873 or even earlier.

For miners' shift earnings, it is possible to measure the timing of turning points against those in general business conditions on a quarterly basis over the periods 1890-1914 and 1924-33. Five series are included (see Table 37 and Appendix Table A-24). We find clear lags at each peak, averaging nine months for the five series and over the five reported upper turning points. At reference troughs the evidence is less uniform. Lags prevail, but seven leads and five coincidences occur in the twenty-eight measured instances. Over the average of five troughs, shift earnings show smaller lags (0.7 to 3.7 months) than at peaks, or even a lead (1.3 months in the case of Dortmund). No significant differences were found in the timing of underground miners' and surface workers' shift earnings (see columns 1 and 2 of Appendix Table A-24).

TABLE 36
Average Earnings per Day or Shift, 1871-1882
(marks)

Year	AVERAGE DAILY EARNINGS					AVERAGE SHIFT EARNINGS OF MINE WORKERS				
	Railroad Repair Yards			Metal Works Machinery		Hard-Coal Miners			Iron Ore Miners	
	Breslau (1)	Stargard (2)	BSF System ^a (3)	Krupp, Essen (4)	Vulkan, Sieltin (5)	Hewers and Haulers:		All Workers		
						Dortmund (6)	Dortmund (7)	Aachen (7)	Right of Rhine (9)	Left of Rhine (10)
1871	2.60	2.11	2.21	3.03	2.36	3.00	2.70	3.24	3.65	...
1872	2.80	2.10	2.34	3.39	2.67	4.50	3.18	3.18	3.72	3.18
1873	3.07	2.11	2.77	3.74	3.00	5.00	3.25	3.52	3.77	3.10
1874	3.52	2.36	2.85	3.86	3.12	4.00	3.32	3.48	3.43	3.00
1875	2.88	2.59	3.03	3.89	2.94	3.80	3.05	3.16	3.07	2.96
1876	2.73	2.54	2.75	3.64	2.56	3.00	2.83	2.86	2.54	2.90
1877	2.65	2.50	2.62	3.36	2.69	2.56	2.83	2.50	2.10	2.44
1878	2.65	2.48	2.68	3.21	2.61	2.66	2.93	2.35	2.15	2.25
1879	2.63	2.27	2.75	3.02	2.53	2.55	2.96	2.30	2.31	1.90
1880	2.61	2.16	2.79	3.19	2.53	2.70	3.03	2.55	2.29	2.25
1881	...	...	2.80	3.50	2.53	2.79	3.07	2.52	2.28	2.26
1882	...	...	2.87	3.57	2.57 ^b	3.01	3.16	2.48	2.30	2.29

^a Breslau-Schweidnitz-Freiburg System.

^b Estimated on basis of annual earnings.

SOURCE, by column:

(1 to 3) Victor Böhmert, "Arbeitslohn," *Handwörterbuch der Staatswissenschaften* (1890 ed.), p. 715.

(4, 5, 7 to 10) Jürgen Kuczynski, *Germany 1800 to the Present Day*, pp. 183, 197.

(6) Robert R. Kuczynski, *Entwicklung der gewerblichen Löhne seit der Begründung des Deutschen Reiches*, p. 9.

TABLE 37

Leads and Lags of Miners' Shift Earnings, Selected Centers, Quarterly, 1890-1914 and 1924-1933
(leads, -, and lags, +, in months)

Reference Turning Points	AT PEAKS				AT TROUGHS			
	Hard Coal		Lignite		Hard Coal		Lignite	
	Dortmund	Upper Silesia	Saar- brücken	Halle	Dortmund	Upper Silesia	Saar- brücken	Halle
Ore	Halle				Halle			
Ore	Halle				Halle			
Reference Turning Points	Reference Turning Points				Reference Turning Points			
Jan. 1890	+22	+19	+16	+25	-18	-15	-3	+3
Mar. 1900	+8	+8	+8	+8	+2	+8	+2	+11
Aug. 1903	...	...	...	...	...	...	...	...
July 1907	+4	+4	+7	-5	+5	+17	+8	-7
Apr. 1913	+4	+4	+10	+7	0	+3	0	0
Prewar average	+9.5	+8.8	+10.2	+8.8	-2.8	+3.2	+1.8	+1.8
Mar. 1925	...	...	...	...	+3	+3	...	+3
Apr. 1929	+7	+7	...	+10	...	...	...	...
Average, all peaks	+9.0	+8.4	...	+9.0	-1.3	+3.7	...	+1.7

^a Data start in first quarter of 1924.

^b Based on incomplete evidence.

SOURCE: For basic data, see Appendix Table A-24. For reference turning points, Burns and Mitchell, *Measuring Business Cycles*,

p. 79. In accordance with standard procedure of the National Bureau, the mid-points of the quarterly specific turns were measured against the monthly reference chronology.

The earlier turn of earnings, as compared to rates, can be demonstrated on the basis of more comparable and more comprehensive data for the interwar period. The annual evidence presented in Appendix Table A-2 and Chart 2 shows that turning points of average weekly earnings coincide with those of general business activity both in 1929 and 1932. Hourly earnings also turned with general business in 1929, but they were one year behind the reference recovery in 1932. Thus, compared with wage rates, which lagged one year at the peak and at least one year at the trough, earnings clearly tended to respond more promptly to changes in business activity. Furthermore, in the one case of delay, hourly earnings in 1933 showed a well-defined trough, while wage rates did not. There is no way of ascertaining when and how rapidly the latter might have recovered in the absence of stabilization by government order.²⁷ The conclusion from all the evidence on turning points of wage rates and earnings is that both tended to lag behind turns in general business conditions. The lag in almost all instances was longer in rates than in earnings, often a year or more in rates, but only months in earnings. The data suggest that weekly earnings lagged less than hourly. In some instances wage rates not only maintained their levels but actually continued their cyclical movements for many months after earnings had experienced their cyclical turns. The evidence is too scanty to permit any broad generalization about the differences in the timing of turning points in hourly earnings and hourly rates.

Why do Wages Lag? We have found that wages are tardy in their reactions to cyclical changes in general business conditions. Sometimes they skip cycles altogether. This behavior requires some interpretation.

One obvious reason for the delay in rate adjustments to cyclical turns is the difficulty of identifying such turns at the time of their occurrence. Even if statistical information were immediately available—and of course it is not—it is always difficult to decide whether a current reversal in business conditions is cyclical in character or merely one of the minor ripples which develop at all times. And even if turning points could be

²⁷ On a quarterly basis, shift earnings of soft-coal miners, both above and below ground, for the Reich as a whole, show pronounced lags at the peaks in 1925 and 1929. Hard-coal miners' earnings did not respond to the 1925-26 contraction. At the 1929 peak they reached a high plateau (P_1) about four months after the reference peak and maintained it for more than a year. At the end of the Great Depression, however, rock bottom levels were closely approximated by all miners' earnings during the first quarter of 1932, that is, about a half-year before general business activity reached its low. After the first quarter, earnings moved differently in the reported categories, but it is clear that at the bottom of the Great Depression, miners' earnings did not show the marked lag which could be observed at earlier turning points (see Appendix Table A-25 and Chart 16).

The availability of quarterly data on both wage rates and earnings of coal miners during the interwar period offers an opportunity for study of the differences in their behavior. During the 1929-32 contraction, the rates and earnings records in hard-coal mining show little difference. In soft-coal mining, wage rates rose for more than a year after earnings had reached their top levels.

properly identified at once, there would still remain important forces making for a delay of rate adjustments. Typically, rate increases occur on the insistence of labor, and rate cuts on the insistence of management. What has to be explained, therefore, is the delay in these two parties' initiative and effectiveness.²⁸ The need to maintain friendly labor relations may deter management from insisting on wage adjustments during the first stages of contractions—as long as conditions are not demonstrably bad. After cyclical peaks come decreases in orders, mounting inventories, slowing receipts, and tighter credits, all bringing enterprises into actual or prospective financial straits. Adjustments of costs become imperative—among them adjustments of labor costs. The latter can be partially reduced by layoffs and by avoidance of premium payments, a policy that contributes to the relatively early cyclical response of earnings as compared to rates. In the long run, cuts in basic rates become increasingly important for the individual firms in their struggle to maintain profits. But such cuts become possible only when rising unemployment and retail price declines make employees willing and able to accept them. Conversely, labor's demands become pressing only when new prosperity is clearly secure. After cycle troughs, rising retail prices reduce the purchasing power of the wage rate. For a while, compensation for this loss will occur in terms of longer hours, premium payments, and possibly increased family income through reemployment of family members formerly laid off. Continued price rises will create strong desires for rate increases. These desires, however, will be translated into successful demands only when increasing orders and rising sales make employers able to yield, and when tightening labor market conditions make them willing. The time required for such developments explains much of the delay in the reaction of wage rates to turns in business and employment.

Thus cyclical shifts in relative bargaining power of employers and wage earners lead—at two periods in the cycle—to a situation in which upward and downward adjustments can be fought for successfully. These periods occur only after changes in employment, sales volume, and profits have affected relative bargaining strength. They do not occur close to reference cycle turns but lie well within the expansion or contraction phases. The timing of labor conflicts bears out these observations: the number of working days lost through strikes and lockouts reaches peak heights well within periods of business upswing (Chart 11 and Appendix Table A-1). This is true for the strike peaks of 1905, 1910, 1924, and 1928. In fact the only reference expansions in this series which do not show distinct strike peaks are the short expansion of 1902-3, the *Burgfrieden* period during World War I, and the postwar inflation period. Strikes seem to have been far less important during contractions. Chart 11 indicates that over the years 1899-1932 contraction periods show relatively

²⁸ For a discussion of such delays see Wesley C. Mitchell, *Business Cycles* (University of California Press, 1913), Part III, pp. 464-66; and Creamer, *op. cit.*, pp. 20-22.

low levels of working days lost. Even 1931 and 1932, when the major depression adjustment in wage rates took place, were years when labor strife was at a comparatively low level. The reasons are not far to seek. In periods of business contraction the reduced demand for goods, the swollen inventories, and the availability of unemployed labor render most strikes ineffective.

There are other factors that prevent prompt response of wage rates to changing business conditions. The high degree of organization of both employers and workers tends to enhance the defensive strength of the particular group, which in a given phase of the cycle seeks to maintain the status quo. But probably a more potent factor in the timing of wage rates is the prevalence of collective agreements. Such agreements often cover long periods and may serve to stabilize wage levels for a considerable time after a recognized turn in business conditions. On occasion they may even provide for increases that go into effect after the cycle reaches a peak, or for decreases that become effective after the reference trough has passed. For example, the long delay in rate adjustments after the 1929 peak reflects the fact that many wage contracts expired only in the course of the year 1930.²⁹ Also, published rate adjustments deal with minimum rates. Reduction of voluntary payments in excess of minimum rates could lead to a decrease of actually paid rates before recorded minimum rates declined. There is a reasonable presumption³⁰ that the peak of piece rates at the beginning of the Great Depression may have been reached as early as May 1930. Even this, however, would be a full year after the reference turn.

Earnings shared the tendency of wage rates to lag behind turns in general business conditions. Hourly earnings tended to show a longer delay than weekly earnings, but both lagged less than rates. Any lag in earnings can be traced mainly to the fact that wage rates form an important constituent of earnings. That earnings lag less than wage rates, on the other hand, is due to the prompter response of hours and of premium payments to changes in business activity.³¹ Finally, the lesser lag of weekly as compared with hourly earnings is explained by the fact that changes in hours affect weekly earnings both directly and indirectly (by varying the relative importance of hours at premium rates), whereas they influence hourly earnings only indirectly.

²⁹ This is true for building, metals, textiles, and hard coal. See Horst Wagenführ, "Kartelpreise und Tariflöhne im Konjunkturverlauf," *Jahrbücher für Nationalökonomie und Statistik*, 1933, Vol. 1, pp. 508-9 (Jena, 1933).

³⁰ The arbitration award of Oynhausen, made in May 1930, permitted decreases of voluntary overpayments of piece rates and precipitated a wave of downward adjustments. See *Reichsarbeitsblatt* 1930, Part II, p. 111.

³¹ On an annual basis, cyclical turns of average hours coincided with the turns in general business conditions in 1929 and 1932. Even on a monthly basis, average hours seem to turn within one or two months of the reference turning points (see Chart 27, below). There is not enough information to generalize about the timing of hours during business cycles in Germany.

AMPLITUDE AND PATTERNS OF WAGE CYCLES

Cycle Amplitudes

RATE MEASURES. Only for the first decade of the Reich's prewar history can true cycles in wage rates be identified and some measures of the amplitudes of their fluctuations be computed.³² Appendix Tables A-3 and A-4 offer some of the evidence. Hourly building rates increased by about 45 percent from 1871 to 1876, and declined by about 19 percent³³ between the latter year and 1882. Printing rates show milder fluctuations—a 33 percent increase and a 7 percent decrease during their *Gründerjahre* cycle. Hourly rates of railway repair yard workers in Upper Silesia declined 12 to 22 percent between 1873 and 1876.³⁴ In general, there must have been great variety in the cyclical behavior of rates during this period. We learn that daily wage rates of building workers in Dresden were about 25 percent lower during 1877 and 1878 than during the *Gründerjahre*, and certain examples indicate declines as large as 30 percent.³⁵ On the other hand, some wage rates seem to have survived the depression of the late 1870's without declines. The daily rate for common labor at the chinaware factories at Meissen, for instance, is reported to have increased from 1.20 marks in 1871 to 2.20 marks in 1876, and to have maintained this level through 1883. Victor Böhmert, one of the foremost labor statisticians of that period, contends that the very low wage rates of common laborers did not go down after 1876 because their plane of living could not be further reduced.³⁶ This does not appear to be a satisfactory explanation. The wage rates of the chinaware workers were not of a lower order than, say, those of railroad repair yard workers, whose rates were in fact reduced. The reasons for the extraordinary resistance of wage rates in the Meissen china works against downward adjustment must be sought elsewhere. The *Meissner Porzellan Manufaktur* was a state-owned enterprise, and it is probable that the maintenance of wage levels was supported by the state, for political reasons, against the downward drag by

³² In principle, amplitudes during these years can be derived for both specific and reference cycles. In periods during which cyclical responses consist mainly in varying rates of growth, or in leveling off during contractions, only reference cycle measures can be used.

³³ In order to derive comparable measures of relative change during expansions and contractions one must attempt to reduce the bias created by the fact that percentage increases are computed from a relatively low, and percentage decreases from a relatively high, level. To minimize this bias, wage (and other) changes during reference cycles are expressed in terms of differences between cycle relatives, the common base being cycle averages. In the case of specific cycles, percentage changes are computed with the averages of the values at specific turning points used as bases. To minimize the effect of random fluctuations on amplitude measures, the peak and trough standings are represented by three-month averages centered at the turn.

³⁴ The periodical *Der Arbeiterfreund* (1878, p. 25) reports a decrease from 18-20 pfennigs to 16 pfennigs.

³⁵ *Der Arbeiterfreund*, 1879, p. 19, and 1880, p. 23.

³⁶ "Statistik des Arbeitslohns," *Handwörterbuch der Staatswissenschaften*, 1890 ed., Vol. 1, pp. 707-8.

competitive forces in the labor market. All in all, the early changes in wage rates, covering the *Gründerjahre* boom and the subsequent contraction, showed increases of about 30 to 70 percent³⁷ and decreases of about 10 to 30 percent. These measures approximate specific amplitudes, except for the fact that the year of the Reich's foundation, 1871, is used as a substitute for an initial trough. It is known that wage rates tended to rise for many years prior to 1871.³⁸ Since these rises have trend character, it would not seem wise to include them in any specific expansion measure—quite apart from the fact that the present inquiry is limited to wage history beginning with the foundation of the Reich.

Another opportunity of measuring the amplitudes of a major specific cycle in wage rates arises for the interwar period. Annual averages of hourly wage rates rose from 1924 to 1930 and declined from the latter year to 1933. The increase amounts to 50 percent, the decrease to about 25 percent of the average of peak and trough. The approximate amplitudes of wage rate changes during the interwar cycle were thus similar—during both rise and fall—to those experienced during the *Gründerjahre* cycle (see Appendix Table A-2 for basic data). If based on monthly averages, the amplitude measures for the interwar cycle are somewhat modified. On that basis hourly union rates, from their low in March 1924 to their peak plateau in May-December 1930, increased by 64 percent. From this plateau down to the trough, reached in April 1933 and stabilized by the National Socialists for many years, wage rates decreased by 25 percent. Thus, monthly data showed a considerably larger increase than annual data during the rise of wage rates, but there was little difference in the extent of the decline. The explanation is simple enough. During the rapid poststabilization adjustment of 1924, the monthly trough in March is considerably below the average for the whole year; by contrast, the subsequent peak and trough positions lie on prosperity and depression plateaus respectively, so that there is little or no difference between the monthly and average annual extremes.

The increase in wage rates between 1924 and 1930 should not, of course, be regarded entirely as a response to the reference expansion of 1926-29. As pointed out before and evident in Chart 14, the 1925-26 reference contraction led to a leveling-out of wage rates between November 1925 and February 1927. Consequently, the specific response of wage rates to the 1926-29 expansion in general business activity might be measured between the terminal edge of this intermediate plateau (T_2 , in February 1927) and the May-December 1930 level. The rise of hourly rates during this shorter span of time was only 20 percent, compared with the 64 percent increase between the poststabilization low and the high prosperity levels.

³⁷ Böhmert, *loc. cit.*, reports for some enterprises increases of 50 to 100 percent, but it is not entirely clear that he refers to wage rates proper.

³⁸ Jürgen Kuczynski, *Germany, 1800 to the Present Day*, pp. 102-7 and 178-99.

The behavior of wage rates during reference cycles can be followed in Appendix Table A-20. Because of the systematic lag of wage rates, their reference cycle amplitudes tend to be considerably smaller than the amplitudes of their specific cycles. For instance, only a minor portion of the *Gründerjahre* rise in wage rates took place during the expansion of 1870-72; the decisive rises occurred between 1872 and 1876, a period of contraction in general business. It has already been pointed out that for almost half a century no major cyclical declines occurred. However, both flattening-out and minor cyclical declines are clearly apparent, in the long-term building series and in the samples of effectively paid rates, during the reference contractions of 1890-94 and 1900-1902. For the 1926-32 cycle, the measurement of wage rate amplitudes during reference cycle phases leads to results differing only little from the measures of their amplitudes during the specific cycle of 1927-33. The reason lies again in the step function character of rate changes. Despite the substantial lags in the turning points, or plateau edges, of rates, only small changes in wage levels took place during these lags (see Chart 15).

EARNINGS MEASURES, ALL INDUSTRY. Up to the mid-1920's our information on the amplitudes of earnings is severely restricted by the limitations of the available wage data. Table 36 presents some evidence relating to the *Gründerjahre*. Again, as in the case of wage rates, specific earnings rises are determined from the year 1871 on. Measured in this fashion, specific cycle increases vary between 3 and 50 percent of the average between peak and trough, decreases between 15 and 57 percent. These amplitudes are roughly similar to those found in wage rates. However, the variation of amplitudes within the group of earnings is so wide, and the rates data and earnings data are so different in coverage, that no definite conclusions can be drawn as to the comparative behavior of the two during these early years. Somewhat more enlightening is the comparison of rates and earnings series for the period 1871-1913 in Chart 12 and Appendix Tables A-20 and A-23. In comparison to the three long-term wage-rate series, the earnings series show a more frequent occurrence of genuine cycles. It appears that wage rates fluctuate least, hourly earnings somewhat more, and daily and shift earnings most.

Comparisons between amplitudes of rates and earnings become feasible at last for the interwar period. Amplitudes of hourly rates, hourly earnings, and weekly earnings, all in annual form, are given in the following tabulation: We note that in all cases, hourly rates showed the smallest amplitudes, hourly earnings intermediate, and weekly earnings the largest. The reasons for this order are similar to those determining the timing relationship between these series. The behavior of earnings is affected not only by wage rates, but also by other elements, particularly the number of hours worked.

Inspection of Charts 12 and 2 shows that, also during reference cycles, earnings amplitudes were larger than those of wage rates (see also the

CHANGES IN PERCENT OF THE AVERAGE OF
TERMINAL POINTS

	<i>Average hourly rates</i>	<i>Average hourly earnings</i>	<i>Average weekly earnings</i>
From 1925 to specific peak	+28	+31	+32
From 1924 to specific peak ^a	+51	+56	+60
From specific peak to specific trough	-25	-31	-40

^a According to our estimates of 1924 levels.

amplitude measures in Appendix Tables A-20 and A-23). For the period 1886-1902, for which information on effective wage rates is available, the following tabulation shows reference cycle amplitudes of six rate and three earnings series: In the two prewar cycles the amplitudes of wages

AVERAGE ANNUAL CHANGE OF CYCLE RELATIVES

	<i>Expan- sion 1886-90</i>	<i>Contraction 1890-94</i>	<i>Expan- sion 1894- 1900</i>	<i>Contraction 1900- 1902</i>	<i>Average of 2 Cycles</i>	
					<i>Expan- sions</i>	<i>Contraction sions</i>
Union Rates						
Hourly printing rates	+1	+1	+0	+4	+0.5	+2.5
Hourly building rates	+4	-0	+2	+1	+3.0	+0.5
Weekly printing rates	+1	0	+1	+4	+1.0	+2.0
Weekly building rates	+3	0	+2	0	+2.5	0
Effective Rates						
Hourly building rates	+3	+0	+3	+1	+3.0	+0.5
Hourly machinery rates	+6	-2	+3	-2	+4.5	-2.0
Earnings						
Daily earnings, Krupp	+2	+1	+3	-3	+2.5	-1.0
Shift earnings, Dortmund, miners	+9	-2	+5	-7	+7.0	-4.5
Weekly earnings (Comprehensive series)	+3	0	+2	-1	+2.5	-0.5

SOURCE: Appendix Tables A-20 and A-23.

were small and so were the differences between them. The evidence suggests a somewhat stronger cyclical response of effective rates as compared to union rates, and a somewhat stronger response of earnings as compared to rates. For corroborative evidence we must turn to the interwar measures. These show clearly larger amplitudes of earnings as compared with rates, and larger amplitudes of weekly as compared with hourly earnings. This observation is valid both for the expansion and the contraction phases.

AVERAGE ANNUAL CHANGE OF CYCLE RELATIVES,
ALL INDUSTRY

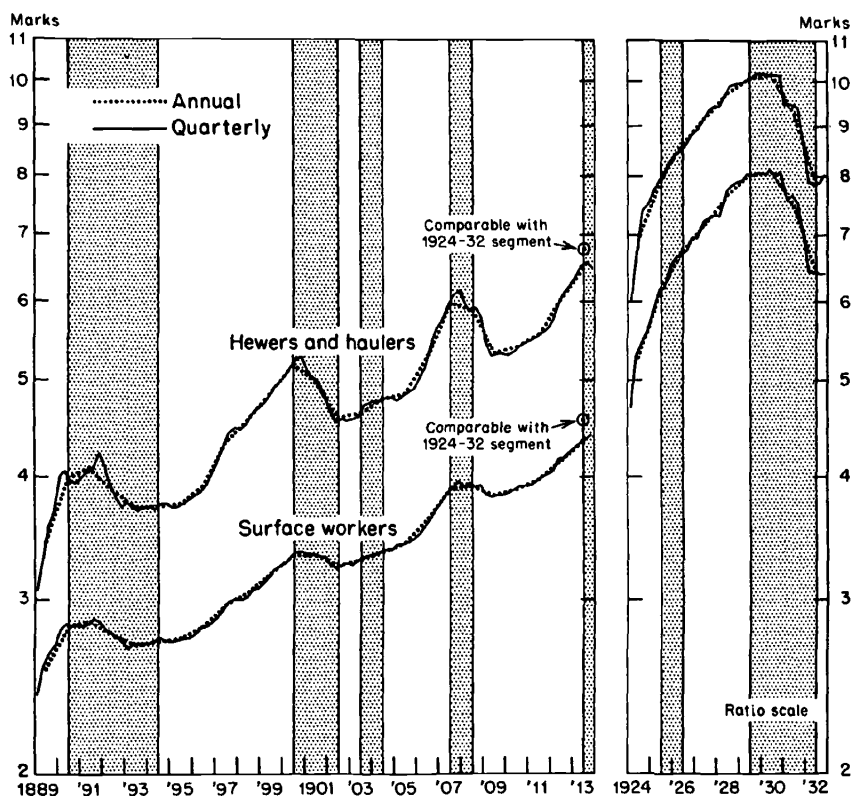
	<i>Expan- sion 1923^a-25</i>	<i>Contraction 1925-26</i>	<i>Expan- sion 1926-29</i>	<i>Contraction 1929-32</i>	<i>Average of 2 cycles</i>	
					<i>Expan- sions</i>	<i>Contraction sions</i>
Average hourly rates	+22	+9	+6	-7	+14	+1
Average hourly earnings	+25	+7	+8	-9	+16	-1
Average weekly earnings	+29	+4	+9	-13	+19	-4

^a Based on incomplete reference expansion. Expansion is measured from 1924 on.

MINING. The information on shift earnings of miners is markedly superior, both in time coverage and quality, to available earnings records for other industries. From 1886, the mining data are reported separately for underground miners and workers above ground for a variety of coal, ore, and salt mines on an annual basis, and from 1889, on a quarterly basis.

CHART 17

Average Shift Earnings of Coal Miners, Dortmund, Annual and Quarterly Data, 1889-1913 and 1924-1932



Shaded areas represent business contractions, in terms of annual chronology.

Source: Appendix Tables A-6, A-7, and A-24.

Comparison of quarterly and annual data shows only moderate differences in cyclical amplitudes³⁹ (see Chart 17). For the Dortmund underground coal miners, for instance, the average rise in the specific expansions during the cycles 1891-1913 and 1924-32, was 34 percent on the basis of quarterly, and 29 percent on the basis of annual, data. The corresponding specific

³⁹ Here amplitudes—both for reference and for specific cycles—are expressed in terms of differences between cycle relatives. For an explanation of these measures see footnote 33 above.

declines amounted to 18 percent and 15 percent respectively.⁴⁰ Chart 4 permits a comparison of amplitudes in the earnings of underground miners and surface workers. During the period prior to 1913 the earnings of underground workers fluctuated considerably more than those of surface workers. In the poststabilization period this difference was less pronounced. The reason for the differing behavior of the two series is that earnings of underground miners were based largely on output, while surface workers were generally paid on a time basis. For the period 1924-32 the importance of this difference is reduced, however, by rapid changes in wage rates which affected underground miners and surface workers to almost the same extent.

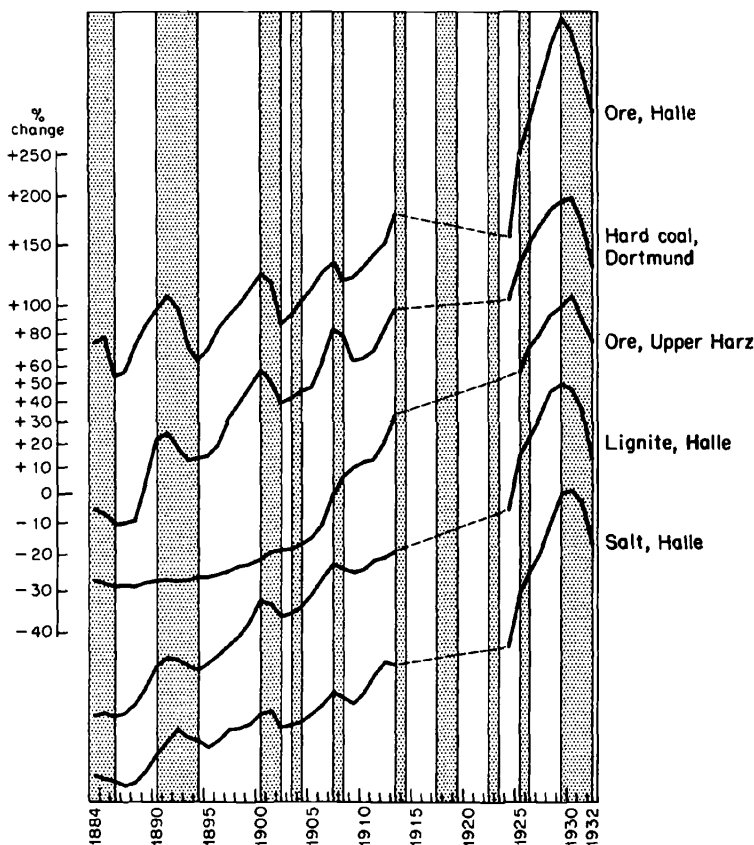
There were marked variations in the cyclical fluctuations of earnings in different districts and different types of mines (see Chart 18 and Appendix Tables A-26 and A-27). The type of product mined seems to have had important effects on the amplitudes of shift earnings. Thus the largest amplitudes occur in the copper ore mines of Halle. Apparently the marked fluctuations in the effective demand for this basic industrial material led to wide swings in the number of shifts worked, in the average length of shifts, and in the incidence and extent of premium payments.⁴¹ By contrast, note the smaller earnings fluctuations of those mines in Halle which produce potash for fertilizers and salt for human consumption. The steady growth and the low income-elasticity of the demand for these products seem to have protected not only production and prices, but also workers' earnings, from violent cyclical swings. Even among different coal-mining centers, some variation in earnings amplitudes can be traced to differences in the product. Lignite from Halle, for instance, was used largely for home fuel, while the hard coal output of Dortmund went mainly into industrial consumption. Corresponding to the larger cyclical amplitude in industrial as compared with domestic use, shift earnings in Halle's lignite mines show smaller swings, at least during specific cycles.

For every one of the ten series, increases during expansions were clearly larger than decreases during contractions. The aggregate measure of earnings in all ten mining districts shows that the average increase during reference expansions was +15 points, the average decline during contractions -5; the corresponding figures for specific cycles were +26

⁴⁰ See Table 38 and Appendix Table A-26. The brief cycle 1890-91, which appeared in the quarterly but not in the annual data, is excluded from the average to insure comparison of cyclical movements between corresponding peaks and troughs. The difference between the quarterly and annual amplitude measures stems from the fact that the annual data neglect the contribution to the total amplitude of intra-annual fluctuations during peak and trough years. The average difference during expansions is enhanced by the large poststabilization adjustment during the calendar year 1924, which is reflected only in part in the annual record.

⁴¹ Iron ore miners in the Upper Harz experienced remarkably small earnings cycles despite the fact that the product is an industrial raw material. The mines were state owned, and subject to a policy striving for cyclically stable production, employment, and shift earnings.

CHART 18
Shift Earnings of Hewers and Haulers, Selected Centers,
1884-1913 and 1924-1932



Shaded areas represent business contractions.

Source: Appendix Table A-6 and its sources.

and -12 (see Table 38). This situation reflects the strong long-term upward trends. Expansions tended to last longer than contractions, and the rate of change during expansions tended to be greater than that during contractions. The measures of total amplitudes during expansions and contractions do not permit conclusions as to the comparative rates of change per year. These rates, averaged by cycle, are shown in Table 38. During reference cycles the average annual rate of increase in expansions is larger than the average annual rate of decrease during contractions for each of the ten series. During specific cycles, however, coal miners' earnings in Dortmund and ore miners' earnings in Halle and Siegen-Nassau show larger average annual changes in contractions than

TABLE 38

Amplitudes in Shift Earnings of Hewers and Haulers,
1889-1913 and 1924-1932

	AVERAGE AMPLITUDES OF CYCLE RELATIVES ^a			
	<i>Reference Cycles</i>		<i>Specific Cycles</i>	
	<i>Expansions</i>	<i>Contractions</i>	<i>Expansions</i>	<i>Contractions</i>
Hard coal, Upper Silesia	+15	-4	+25	-10
Hard coal, Lower Silesia	+14	-4	+25	-11
Hard coal, Dortmund ^b	+16	-6	+29	-15
Hard coal, Saar District ^c	+8	-2	+13	-6
Hard coal, Aachen	+16	-5	+27	-12
Soft coal, Halle	+14	-4	+24	-10
Salt, Halle	+14	-2	+23	-8
Ore, Halle	+23	-10	+37	-22
Ore, Upper Harz	+13	+2	+48	-9
Ore, Siegen-Nassau	+22	-12	+34	-20
Ten Centers	+15	-5	+26	-12

	AVERAGE ANNUAL CHANGE OF CYCLE RELATIVES ^a			
	<i>Reference Cycles</i>		<i>Specific Cycles</i>	
	<i>Expansions</i>	<i>Contractions</i>	<i>Expansions</i>	<i>Contractions</i>
Hard coal, Upper Silesia	+6	-1	+5	-4
Hard coal, Lower Silesia	+6	0	+5	-5
Hard coal, Dortmund ^b	+6	-1	+5	-8
Hard coal, Saar District ^c	+2	0	+3	-3
Hard coal, Aachen	+6	-1	+6	-4
Soft coal, Halle	+6	-1	+4	-4
Salt, Halle	+6	0	+4	-4
Ore, Halle	+10	-2	+7	-9
Ore, Upper Harz	+3	+3	+4	-4
Ore, Siegen-Nassau	+8	-6	+7	-9
Ten Centers	+6	-1	+5	-4

^a The changes of cycle relatives are based on annual series. The averages presented are derived from measures for individual cycle phases, that is each cycle phase carries the same weight irrespective of years covered.

^b For Dortmund the given measures were compared with others derived from quarterly data; the two sets were very similar, as could be surmised from Chart 17.

^c Data end 1913.

SOURCE: Appendix Tables A-6, A-7, A-23, A-24, A-26, and A-27.

in expansions. For the ten districts as a whole, the average annual change in expansions is +5, that in contractions -4 percentage points.

Information pertaining to coal mines in the years 1924-38 provides us with an opportunity of comparing the behavior of rates and earnings, on a quarterly basis, for a well-defined segment of industry. Wage rates and earnings are presented separately for soft and hard coal, and for underground and surface workers, in Appendix Table A-25 and Chart 16. Graphic comparison shows that the amplitudes of rates and of shift

earnings are surprisingly close, differing in this respect from the broad annual wage indexes, wherein earnings amplitudes exceeded those of wage rates by a considerable margin.

EXCESS OF EARNINGS OVER RATES. The quantitative differences in cyclical behavior as between rates and earnings depend largely on the extent to which various earnings components are permitted to influence the wage measures used. The differences in amplitudes can be traced to the group of factors which "modify" wage rates into earnings. For the years 1924 to 1933 the excess of hourly earnings over rates changed as follows:⁴²

Year	Hourly Rates	Hourly Earnings (pfennigs)	Excess of Earnings over Rates (percent of rates)
1924	51.5	53.3	+3.5
1925	65.0	69.3	+6.6
1926	70.3	73.3	+4.3
1927	74.4	80.2	+7.8
1928	80.8	90.1	+11.5
1929	85.3	94.9	+11.3
1930	86.8	92.2	+6.2
1931	82.3	85.2	+3.5
1932	69.7	71.5	+2.6
1933	67.6	69.3	+2.5

SOURCE: Hourly rates for 1929-33: *Wirtschaft und Statistik*, *passim*; for 1924-28: our estimates, based on index of hourly rates (Appendix Table A-2).

Hourly earnings: our estimates, based on absolute level for 1936 (*Handbuch* 1928-44, p. 469), and index of hourly earnings (Appendix Table A-2).

The cyclical character and the positive conformity of the modifying factors are brought out by these computations. The excesses reach three turning points in advance of, or at the same time as, reference cycle turns; they continue to show a small decline even after the 1932 reference trough.

From September 1927 on, special wage investigations in single industries provide some additional information. They were made every three years but unfortunately not simultaneously for all industries, so that the results do not refer to comparable stages of the cycle.⁴³ Despite this shortcoming,

⁴² The comparison is based on the comprehensive rates and earnings series as given in Appendix Table A-2. For rates the series is based on sixteen industries from 1928 to 1933, the earlier period (1924-27) being extrapolated on the basis of fewer industries. For earnings the whole series is estimated by the Statistische Reichsam. Although the industry coverages are not comparable, the series are so comprehensive that the movements of both may be regarded as representative. The relation of the absolute levels must be considered with more caution. Yet the relation between the levels must be approximately right, for in 1932, when the excess of earnings over rates is known to have been small, the computed difference amounts to only 2.6 percent. It must be understood further that the comparison is between actual hourly earnings and nominal rates; there is practically no information on the excess of actually paid rates over nominal rates.

⁴³ The results are published in *Wirtschaft und Statistik*, and summary tables are reproduced in various issues of the *Jahrbuch*.

the investigations provide some detailed illustrations of the excess of earnings over rates at known stages of the business cycle. The excesses are sometimes surprisingly large—occasionally larger than the rate itself.⁴⁴ The average excess of earnings over rates for whole industries is, of course, more moderate. There are at least two major reasons for the relatively wide industrial variation among the excesses: industries with a large proportion of piece work tended to show higher excesses; and some industries followed a rate policy whereby excesses were built up and then reduced without changes in the agreed rate.

W. Woytinsky observes that the industrial differentials among union rates are larger than those among effective hourly earnings, so that the excesses of earnings over rates tend to reduce extreme differentials in basic rates. In support of this thesis he offers the tabulation below.⁴⁵ The tabulation refers to piece work only and gives no information on the relation of hourly earnings to the corresponding time rates. Other students have found that the relation of earnings to rates is not the same for both time

		<i>Average Hourly Union Rates</i>	<i>Average Excess</i>	<i>Average Hourly Earnings</i>
		(p f e n n i g s)		
Rolling mills	1928	79.8	56.5	136.3
Smelting	1928	81.9	39.3	121.2
Shoes	1929	97.9	26.5	124.4
Metal products	1928	99.0	21.1	120.1
Chemicals	1928	109.8	22.4	132.2
Woodworking	1928	117.5	10.3	127.8

work and piece work. In general, according to Straube,⁴⁶ within an industry the excess of earnings over time rates is greatest for the higher-paid skilled workers. By contrast, the excess over piece rates is greatest when these rates are relatively low. Among different industries, excess of earnings over rates is largest for the industries with low time rates. However, these rules are subject to exceptions, since the excess of earnings over rates is affected by the timing of the investigations and the renewal dates of union contracts.

Cycle Patterns

RATE CYCLES. Wage rate cycles have distinct over-all patterns. We have seen that the movements of printing rates before 1913 approximated a step function because such rate agreements were drawn on a nationwide basis

⁴⁴ For first rollers in Siegerland rolling mills the excess amounted to 125 percent of the rate in October 1928 (*Jahrbuch* 1930, p. 291).

⁴⁵ *Handwörterbuch des Gewerkschaftswesens*, pp. 1575 ff. The author compares wage rates with earnings, excluding premium payments for overtime, etc. However, the use of earnings including premium payments would not materially affect the picture.

⁴⁶ Dora Straube, *Die Veränderungen von Lohn und Preis nach der Stabilisierung in Deutschland* (Kallmünz, 1935).

and for relatively long periods. The long terms of the agreements explain both the progress of the rates by sudden steps, and their poor correspondence with changes in general business conditions. Building rates followed a different course before World War I; they moved more gradually (see Chart 3). Rates in the three selected cities were based on local arrangements which were subject to frequent revision; hence they conformed somewhat more closely to cyclical changes in the economy at large.

The step-by-step movements as well as the smooth progression of average wage levels can be observed in the behavior of monthly union rates during the interwar period. Comparison of Charts 14 and 15 shows that the movements of average union rates for all industry are considerably smoother than those of the component industries. The step-by-step progress, with its many intermediate plateaus and instantaneous rate changes, appears for both individual industries and for their average: (1) during 1925-26 when, under the weight of the business recession, current rate arrangements were commonly continued or changed only slightly; (2) at the prosperity plateau of 1929-30, when long-term agreements in effect in most industries insured stability of wage rate levels; (3) at the end of 1931, when the government's emergency decree brought about compulsory rate adjustments in all industries; and (4) from 1933 on, when the stabilization policy of the National Socialist regime prevented a cyclical recovery of wage rates.

In periods when changes in wage rates were neither controlled nor suppressed by external forces, appreciable differences may be observed in their behavior patterns from industry to industry. Investigation of rates for skilled male workers in various industries shows that relatively smooth changes of industry averages prevailed in brewing, textiles, and metals—all of which had wage agreements of relatively short duration and predominantly local or regional character. In other industries, changes of average rates occurred by steps whenever the agreements were Reich-wide, as in printing, or when wage agreements were concluded at a particular season. Pottery, chemicals, and book printing tended to experience wage-rate changes in the spring, soft coal in the winter.⁴⁷

In monthly union rates the expansion phase is markedly longer than the contraction (see Chart 14). If the whole period of March 1924 to April 1933 is regarded as one huge cycle, the asymmetrical character of the wave is most pronounced—an expansion of 80 months compared to a contraction of 31 months. If, on the other hand, the plateau from November 1925 to February 1927 is regarded as a contraction, then two specific cycles are to be recognized, with troughs at January 1924, February 1927 (T_2), and April 1933 (T_1). Even here the asymmetry is apparent: the first cycle embraces an expansion of twenty-two months and a contraction of fifteen, and the second an expansion of forty-six months and a contraction

⁴⁷ *Ibid.*, p. 27.

of twenty-eight.⁴⁸ In the same chart the duration of these cycle phases can be compared graphically with that of the corresponding reference cycle phases, in which, also, the length of expansions exceeds that of contractions. But this excess is far less pronounced than for wage rates.

EARNINGS CYCLES. The contours of the cyclical movements of earnings tend on the whole to be smoother than those of rates (see Chart 12). That we find smoother lines for earnings is not surprising, since the elements which modify rates into earnings change, by and large, gradually.

The asymmetry of wage cycles is apparent also in earnings; shift earnings of miners, for instance, form cycles with considerably longer expansion than contraction phases. For the quarterly earnings series of Dortmund coal miners, the standard analysis of the National Bureau established an average duration of specific expansions of 57.0 months, while specific contractions lasted only 20.4 months.⁴⁹ Reference cycles show a less extreme difference between the duration of expansions and contractions.

The cyclical patterns of shift earnings in Dortmund were not exceptional. Although, as pointed out above, the behavior of miners' earnings is diversified (see Chart 18), annual averages of shift earnings of hewers and haulers in ten mining districts show the same general pattern as the earnings of Dortmund miners (see Chart 4). The asymmetry and the smoothness of earnings cycles are notable also in the comprehensive earnings index available for the interwar period (see Chart 2).

WAGE CYCLES AND EMPLOYMENT

Timing Relations. We shall now proceed to relate wage cycles to changes in employment conditions, to fluctuations in the occurrence and intensity of labor strife, and various types of governmental activity—in short, to changing conditions in the labor market. First to be investigated is the relation of fluctuations in wages to changes in employment.

On the whole, changes in employment are rather closely correlated with movements in general business activity. Even the scant statistical data available for the years prior to World War I indicate clearly that employment fluctuations conform closely to the ups and downs of business conditions. For the interwar period the relation of reference turns, employment cycles, and wage behavior can be discussed on the basis of considerably better data. Monthly indicators of employment conditions, in deseasonalized form, are compared in the accompanying tabulation with the peaks and troughs in general business activity. It shows, that

⁴⁸ Here the end of the prosperity plateau in December 1930 is regarded as the upper turning point (P_2) of the second cycle. Even if the prosperity plateau itself is not included in either specific expansion or contraction, the duration of the actual rise exceeds considerably that of the actual decline. Only if the beginning of the plateau (P_1) in May 1930 is regarded as dividing expansion and contraction, does the duration of the two phases become almost the same.

⁴⁹ In five cycles during 1890-1914 and 1924-32.

CYCLICAL TURNING POINTS IN EMPLOYMENT INDICATORS
AND IN GENERAL BUSINESS CONDITIONS

Turning Points	Reference Cycles	Unemployment ^a		Employed Members of Sickness Insurance		Employment in Percent of Capacity
		At Employment Exchanges	In Percent of Union Membership	Series I	Series II	IKF
Dates of Turning Points						
Peak	Mar. '25	May '25	May '25	...	...	...
Trough	Mar. '26	Aug. '26	July '26	June '26	...	...
Peak	Apr. '29	Oct. '27	Apr. '28	Feb. '28	Aug. '29	Aug. '28
Trough	Aug. '32	July '32	July '32	...	July '32	Aug. '32
Leads, —, and Lags, +, of Employment Indicators (in months)						
Peak	Mar. '25	+2	+2	...	...	...
Trough	Mar. '26	+5	+4	+3	...	...
Peak	Apr. '29	—18	—12	—14	+4	—8
Trough	Aug. '32	—1	—1	...	—1	0

^a The peaks and troughs of the unemployment series were inverted to make them comparable with the other measures in this tabulation.

SOURCE: Appendix Table A-28. For graphic presentation of registered unemployed and employed members of sickness insurance funds, see also Chart 27.

during the relatively mild contraction of 1925-26, the available employment indicators reacted with a tardiness of about 2 to 5 months at peak and trough. During the Great Depression of 1929-32, turns in the employment indicators tended to precede those in general business activity—at the 1929 peak by eight to eighteen months,⁵⁰ but by only one month at the subsequent trough.

Wage lags behind employment turns would obviously differ from those behind reference turns. Their timing in relation to reference turns and to

TURNING POINTS				LAG OF WAGE RATES, IN MONTHS:	
	Reference Cycles	Unemployment	Wage Rates	Behind Reference Turns	Behind Unemployment
Peak	Mar. '25	May '25	Nov. '25 (P ₁)	8	6
Trough	Mar. '26	Aug. '26	Feb. '27 (T ₂)	11	6
Peak	Apr. '29	Oct. '27	May '30 (P ₁)	13	31
			Dec. '30 (P ₂)	20	38
Trough	Aug. '32	July '32	Mar. '33 (T ₁)	7	8

SOURCE: Table 34 and Appendix Table A-28.

⁵⁰ Also employed members of sickness insurance associations show a marked lead, according to the unrevised series (i). The revised series (ii) shows a lag of 4 months, or, if May is regarded as an alternative peak, a lag of 1 month. The latter segment ii differs from the earlier segment i mainly in that it is based on a constant number of reporting insurance societies. *Reichsarbeitsblatt* 1932, Supplement 10, pp. 6 ff.

unemployment may be observed in the last tabulation. In each case the lag of wage rates remains even if the length of the lag changes. Obviously the delayed response of wage rates cannot be explained by lags in employment.

Pertinent also is the degree of unemployment at the time wage rates reacted to the deterioration of labor market conditions. Taking the 1929 peak as an example, we find that when the top plateau in wage rates was reached (P_1 , in May 1930), unemployment amounted to almost 3 million, and the unemployment rate of union members to 20 percent—both before seasonal adjustment. At the terminal point of the plateau (P_2 , in December 1930), that is, at the last month before union wage rates showed an actual decline, unemployment had hit the 3.5 million mark and the unemployment rate among trade union members was 34 percent. Also to be noted is the extent of part-time employment among trade union members—another 21 percent of their membership. That is to say, full time employment had been reduced to 45 percent of organized workers before wage rates gave way to the labor market pressures.

Large-scale unemployment, coupled with maintenance of wage-rate levels, was historically a new experience. This became the basis of claims that wage-rate behavior had acquired characteristics which seriously interfered with the mechanisms normally relied upon to bring about recovery. The strength of the unions was cited as the major reason for this rigidity. Whether or not such assumptions were sound, there can be no doubt that both union rates and effective rates did in fact resist downward adjustment in the face of widespread unemployment.

Amplitudes

ALL INDUSTRIES. The magnitude of changes in wage levels is, to a certain extent, correlated with amplitudes of employment cycles, as shown by the data presented in Appendix Tables A-1, A-2, and A-28, and Charts 26 and 27 later in this chapter. Associated with the moderate decline of employment (among employed subscribers to sickness insurance) from 104.7 in 1925 to 97.1 in 1926 (December 1924 = 100) is a scarcely noticeable reaction of wage rates, and a slight deceleration in the increase of earnings.⁶¹ The more substantial employment changes from 1926 to 1929 and from 1929 to 1932 (+10 percent and -34 percent respectively), on the other hand, were accompanied by hourly rate changes of +19 percent and -20 percent, hourly earnings changes of +25 percent and -28 percent, and weekly earnings changes of +8 percent and -40 percent respectively.⁶² The positive relation between the amplitudes of employment and wages appears particularly clearly in the comparison between the two contraction phases, 1925-26 and 1929-32.

⁶¹ Wage and employment changes during the preceding expansion are neglected because of the atypical poststabilization adjustment of wage rates.

⁶² Changes for each cycle phase are expressed in percent of the average of the standing at both turning points. Computations are based on annual data.

Over long periods of time, however, one cannot find such close relationships for the fluctuations in wages and employment. For instance, the amplitudes of wage fluctuations during the *Gründerjahre* cycle of 1870-79 and during the Weimar Republic cycle of 1926-32 were of similar magnitude, though the two business cycles differed greatly in severity. The Institut für Konjunkturforschung calculates the decrease in volume of production during the first cycle as 10 to 20 percent.⁵³ During the Great Depression the decrease in production was 42 percent (of peak level).⁵⁴ Relative to the severity of the cycle, wage rates were less flexible in the Great Depression than in the 1870's.

We can compare cyclical amplitudes of wage rates in various industries with those of measures of employment in the same industries.⁵⁵ Table 39 contains such measures, on an annual basis, for fifteen industries which are arrayed according to the severity of their wage-rate declines. For a number of industries, the table shows also the percentage decline in finished product prices. There appears to be little correlation between the severity of wage-rate declines and declines in finished product prices. The evidence shows a tendency of wage rates to fall more sharply in industries with greater employment and production declines. We find also that wage-rate, employment, and production declines tend to be milder in consumers' goods industries than in producers' goods—a fact that may help to explain the differences in absolute wage levels between these industry groups.

MINING. The data on this industry permit us to relate amplitudes in the fluctuations of shift earnings to those in employment and other relevant variables. Total employment in ten mining districts, and shift earnings for underground miners and for surface workers in the same establishments are compared in Chart 19. The most striking features of the employment series are the bold rise during the pre-1913 period and the precipitous fall during the interwar years. The rise is due, of course, to the rapid industrial expansion of the country up to World War I; the fall is due to the introduction of laborsaving devices during the mid-1920's and, after 1929, to the effects of the Great Depression. Chart 19 shows only a limited correlation between mining wages and mining employment. Up to 1913 miners' earnings evidenced relatively strong fluctuations in periods where mining employment showed cyclical influences only in the form of retardation of growth.⁵⁶ Similarly, during the expansion of 1926-29,

⁵³ *IKF Sonderheft* 31, p. 43. Note, however, that the published index of industrial production shows a decline of only 6 percent, with a decline of 4 percent in producers' goods and 10 percent in consumers'; *op. cit.*, p. 58 (measures in percent of peak levels).

⁵⁴ See Appendix Table A-1.

⁵⁵ Reference-cycle amplitudes during the Great Depression are the only measures that can be derived for a sufficient number of wage-rate, employment, or production series to permit systematic comparisons.

⁵⁶ The strong secular trends in mining employment make it difficult to relate the observed variations in cyclical amplitudes of earnings among different mining districts to corresponding variations in employment.

TABLE 39

Cyclical Declines in Wage Rates, Prices, and Employment, from 1929 to 1932
(percent)^a

Industry	Decline in Union Rates (1)	Decline in Employment ^b (2)	Decline in Percentage of Employed Union Members (3)	Decline in Production Indexes (4)	Decline in Finished Product Prices (5)
Building	25.3	75.1	74.9	66.5	26.5
Hard coal	20.4	...	...	35.9	15.4
Woodworking	19.8	44.3	57.6	54.1	...
Paper products	18.4	35.0	35.7	...	37.6
Chemicals	17.3	...	27.1	44.6	17.0
Printing	17.2	...	29.5	18.9	...
Metals	16.9	...	39.1	40.5	10.8
Papermaking	16.1	22.3	21.4	20.8	37.6
Pottery	16.0	...	34.8	43.2	...
Clothing	15.9	33.2	29.6	16.8	31.3
Food	15.8 ^c	14.2 ^d	18.6 ^e	12.0 ^f	...
Soft coal	14.4	...	...	29.8	...
Textiles	13.6	22.8	24.1	16.5	55.7
Shoes	12.5	...	21.3	17.8	32.6
Brewing	12.1	...	...	41.2	...

^a Percentage changes are stated in conventional form, i.e., they are based on levels for the year 1929.

^b Data give employment as percent of "employment capacity." However, this technologically determined capacity does not change greatly in the short run, particularly during contractions.

^c Baking and confectionery.

^d Average decline in foods (10.7%) and in coffee, tea, beer, tobacco, etc. (17.6%).

^e Foods and beverages, but excluding tobacco.

^f Foods, beverages, and tobacco.

SOURCE, by column:

(1) Computed from Appendix Table A-21.

(2) From *IKF Handbuch* 1936, pp. 19-24.

(3) From *IKF Handbuch* 1933, p. 25 ff.

(4) From *IKF Handbuch* 1936, pp. 49-50.

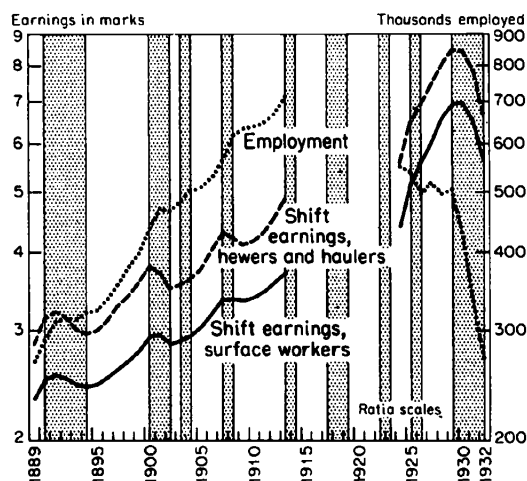
(5) From Appendix Table A-32.

earnings increased substantially, although employment barely maintained its level. Finally, during the contraction of 1929-32, earnings decreased only moderately despite a precipitous decline in employment. Apparently miners' earnings fluctuated more with general business conditions and with wages in other industries than with employment in the mining industry itself.

For the hard coal mining district of Dortmund, an attempt was made to assemble more detailed evidence on employment, shifts worked, production, productivity, and other factors that might help to explain the cyclical behavior of miners' earnings (see Appendix Tables A-6, A-7, and A-29, and Chart 20). The data suggest that extra shifts and overtime

shifts played an important role in this respect. Frequently such shifts were not counted separately, so that the overtime pay appears as increased "shift" earnings. Market conditions and the coal price also influenced earnings. In periods of high prices and brisk demand, employers were liberal in their standards of what constituted a full cart and what kind of coal warranted premium pay because it was extra hard, came from thin seams, or was not easily accessible. All these elements entered into the

CHART 19
Shift Earnings and Total Employment in Ten Mining Centers,
1889-1913 and 1924-1932



Shaded areas represent business contractions.

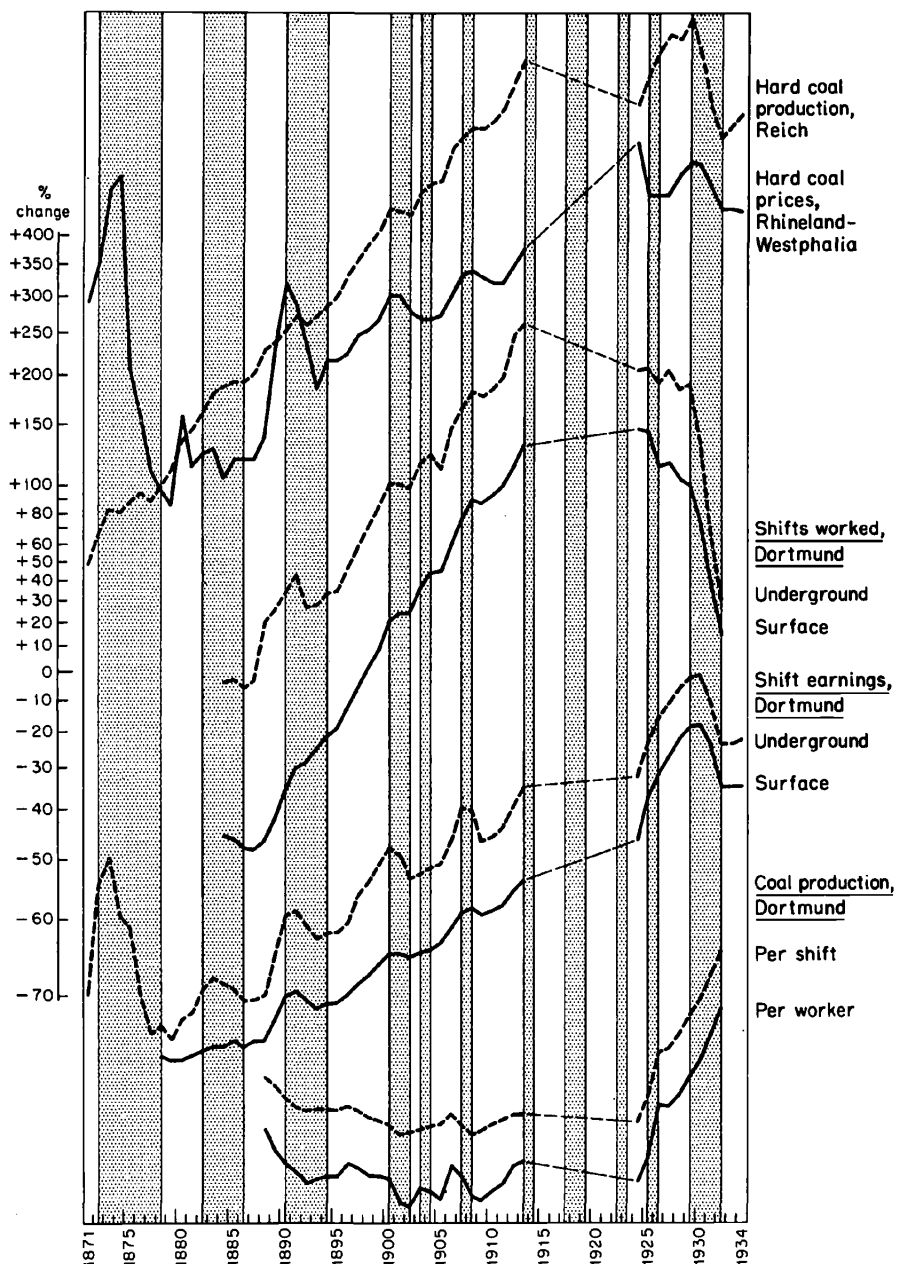
Source: Appendix Tables A-6 and A-7. For employment, see *Zeitschrift für das Berg-, Hütten-, und Salinenwesen, passim*.

wage arrangement and could be shaded in what was essentially an adjustment of piece rates for underground miners. Surface workers served on a time arrangement. But changes in their basic rates and the incidence of overtime imparted cyclicity—though of smaller amplitudes—also to the shift earnings of these workers.

Wages, Employment, and Payroll. The roles played by rates, earnings, and employment in labor-market cycles can be analyzed through their contributions to payroll changes. The available data do not permit a breakdown of payroll fluctuations into their determinants, for a full cycle; but such an analysis can be carried through for the business contraction of 1929-32. The basic data are to be found in Table 40, where we note that during this reference contraction the total payroll in manufacturing and mining industries decreased by 60 percent,⁵⁷ while employment went down about 40 percent. Average annual (or weekly) earnings, for wage earners who kept their jobs, were reduced by about one-third; part of this loss

⁵⁷ The percentage changes are measured from the peak.

CHART 20
Average Earnings of Dortmund Miners, and Other Variables,
1871-1913 and 1924-1934



Source: Appendix Tables A-8 and A-29 and their sources.

TABLE 40
Cyclical Changes in the Industrial Payroll and Its Major Components,
1929-1932

	Unit	1929	1930	1931	1932
(1) Hourly union rates	pfennigs	85.3	86.8	82.3	69.7
(2) Ratio of earnings to rates	ratio	1.113	1.062	1.035	1.026
(3) Average hourly earnings (line 1 \times line 2)	pfennigs	94.9	92.2	85.2	71.5
(4) Number of hours worked per week	hours	46.02	44.22	42.48	41.46
(5) Number of weeks per year	weeks	48.7	49.0	49.0	49.0
(6) Number of hours worked per year (line 4 \times line 5)	hours	2240	2167	2082	2032
(7) Average annual earnings (line 5 \times line 6)	marks	2126	1998	1774	1453
(8) Employed workers	million workers	6.241	5.428	4.492	3.711
(9) Total wage payroll (line 6 \times line 7)	billion marks	13.27	10.85	7.97	5.39

SOURCE, by line:

(1) *Wirtschaft und Statistik*, *passim*.

(2) Computed: (3) \div (1).

(3) Our estimate based on absolute levels (*Handbuch* 1924-44, p. 469) and index (Appendix Table A-2).

(4) Our estimate. Hours worked per day (*IKF Handbuch* 1936, p. 32), multiplied by 6.

(5) 1929 and 1932 computed: (6) \div (4); 1930 and 1931 assumed to be equal to 1932.

(6) Computed: for 1929 and 1932 (7) \div (3) \times 100; for 1930 and 1931 (4) \times (5).

(7) Computed: for 1929 and 1932 (9) \div (8); for 1930 and 1931 (3) \times (6).

(8) *Handbuch* 1928-44, p. 480.

(9) 1929 and 1932, *Wirtschaft und Statistik*, 1939, p. 301. For 1930 and 1931, computed: (7) \times (8).

Hourly rates and earnings are averages based on constant weights. Any resultant inaccuracies are of minor importance, for the limited purposes of this table.

must have been due to the shortening of the average workweek by about 10 percent. Average hourly earnings dropped by only 25 percent, and the decline of minimum rates set by collective agreement was still milder, amounting to about 18 percent. That the drop was larger in average hourly earnings than in rates may be explained on several counts. Among them are the decline of work at premium rates; reduction of output paid for by piece rates; changes in the industrial, sex, and age composition of the work force and of hours worked; and the decrease of voluntary rate payments in excess of agreed minima. No data are available for an evaluation of the changes in these factors. It can be estimated, however, that the average excess of hourly earnings over minimum union rates amounted to about 11 percent in 1929, but to only 3 percent in 1932.⁵⁸

Having presented the percentage changes of various payroll components, let us measure the contribution made by each of these components to the

⁵⁸ This statement is based on the possibly incautious assumption that the rates and earnings samples are roughly comparable.

total decline in industrial payroll.⁵⁹ According to this tabulation the

Contribution of Major Factors to Payroll Decline, 1929 to 1932

<i>Decline in—</i>	<i>Billions of Marks</i>	<i>Percentage Contribution</i>
Employment	4.70	59.7
Hours	.94	11.9
Excess of hourly earnings over rates	.85	10.8
Wage rates	1.39	17.6
Total industrial payroll	7.88	100.0

decrease in employment accounts for more than half of the total payroll reduction, and the decrease in employment and hours together for more than 70 percent. The drop in hourly earnings accounts for close to 30 percent of the total decline, and that in wage rates proper for less than 20 percent. It must be stressed that these figures describe the numerical contribution of the various factors, but do not reflect the causal importance among the variables.⁶⁰

⁵⁹ The approach to the measurement of these contributions was originally suggested by Paul Boschan. It is described in a joint paper to be separately published. Roughly, the total contribution of each factor is built up from its contributions to changes in the product of the several factors during small subperiods—in this case the year-to-year changes. Within the subintervals, the contribution of each factor can be regarded as a compromise between its maximum and minimum possible contribution. Computationally, the contribution of each factor is derived from the weighted change of the particular factor during the subinterval, the weights being determined by the average levels of the other factors. The weighted changes of the various factors add up, in each subinterval and interval, to the change in their product.

⁶⁰ The German government's wage-rate decree of 1931 was accompanied by an extended controversy on the cyclical consequences of alternative wage policies. The problem was whether a deflationary wage policy should be pursued in order to increase profitability, or whether maintenance or perhaps even an increase of wage rates would augment purchasing power, and thus serve to restore prosperity. The following findings of the present study may bear upon this controversy: (1) wage rates showed material cyclical declines only twice in the seventy-five-year period; (2) these decreases lagged behind turns in general business; (3) the numerical contribution of the decline of union rates to the total payroll contraction was limited to about one-fifth.

We can now perceive that the argument for high wage policies was subject to certain limitations: The decline in wage rates contributed little to the decline in the payroll, and still less to the contraction of total purchasing power. The depression continued to deepen despite the fact that high wage levels were maintained for a long time—about one and one-half years—after the turn in general business conditions. Under the enormous pressures of unemployment, actual upward adjustments of wage rates would have been extremely unlikely. The statistical evidence also throws some light on the alternative proposition, that is, the policy of stimulating employment and supporting profitability by decreasing wages. Relevant in this connection is the rare occurrence of actual rate declines, their relatively mild character, and the long delays involved. Also, both parties to the wage controversy would have done well to give adequate weight to the international aspect of the economic catastrophe, of which German events formed only a part. In focusing their attention on wage rates, both sides tended perhaps to overestimate the strategic importance of an economic variable which is relatively inflexible and constitutes only one of many factors in the complex cyclical process.

Cycles in Wage Rates and Prices

GENERAL

Comparisons of the cyclical behavior of wage rates and prices can be carried through only in rather rough form, for several reasons. Neither the prices nor the wage rates reported were necessarily those paid (effective prices or rates). The wholesale prices at our disposal are for the most part list prices and do not show concessions that might have been frequent in slack periods. And the wage rates we quote are generally minimum rates which cannot reflect the higher payments made in lively periods of business. During the years of the Weimar Republic, prices tended to have a maximum and wages a minimum character.⁶¹ While list prices tended to be closer to effective prices during prosperity, and union rates closer to effective rates during depression, the published quotations in both instances failed to describe the full amplitudes of actual fluctuations. Moreover, the industrial coverage is reasonably similar for only a few price-wage comparisons; in general, our indexes do not cover the same segment of the economy. These shortcomings do not vitiate all comparisons of prices and wages, but they do indicate the limits within which such comparisons can be taken as valid.

CYCLES IN WAGE RATES AND WHOLESALE PRICES

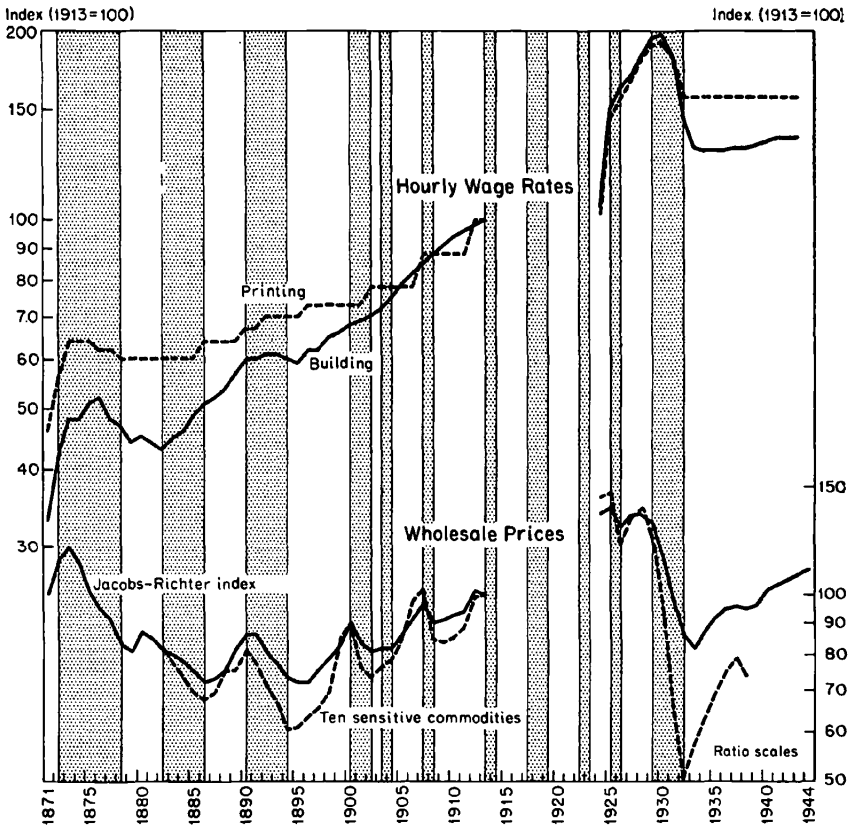
Cyclical Behavior, Annual Series, 1871-1944. Wholesale prices and wage rates for 1871 through 1944 are depicted, on an annual basis, in Charts 6 and 21. Most of the components of the wholesale price index are raw materials prices. A number of differences in cyclical behavior as between these prices and wage rates are to be noted in the rough annual data. First of all, wholesale prices show distinct cycles which in almost all cases can be clearly associated with changes in general business conditions. In wholesale prices there is little skipping of cycles.⁶² Compared with the wage rates traced in the same charts, the conformity of wholesale price cycles to those of general business is definitely superior, and their turning points are closer to business peaks and troughs. Nor do wholesale prices show the strong lags, which are so consistent a feature of wage-rate cycles. It is true that wholesale prices lagged behind the 1872 peak⁶³ and behind the 1878, 1904, and 1932 troughs. On the other hand, wholesale prices showed an early peak before the 1882 break in business prosperity,

⁶¹ Even during this period there may have occurred premium payments above quoted prices and occasional wage payments below union rates. But these must have been exceptional.

⁶² The one exception, for the years charted, is the short and particularly mild 1902-4 reference cycle (see footnote 7 of this chapter). Even in this case, however, traces of cyclicity can be found.

⁶³ This is a rather uncertain peak (see note 20, this chapter). An alternative determination of the upper turning point, in 1873, would make the wholesale price turn coincide, but would not disturb the substantial lag in wage rates.

CHART 21
Wage Rates and Wholesale Prices, 1871–1913 and 1924–1944



Shaded areas represent business contractions.

Source: Appendix Tables A-1, A-3, A-4, and A-30. For source of sensitive commodity prices see also footnote 64, this chapter.

and also before the 1929 reference turn. On most other occasions the turning points roughly coincided.

As for amplitudes, they tended on the whole to be larger in wholesale prices⁶⁴ than in wage rates. This tendency is sometimes obscured by the strong secular, long cycle, and episodic fluctuations apparent in both types of series. For instance, the upward trend in wage rates and the downward trend in prices during the first decade of the Reich's existence made for

⁶⁴ Chart 21 also presents a price index for ten sensitive commodities. The amplitudes for this index are considerably larger than those for the Jacobs-Richter index. Source for sensitive index: 1882-99, direct communication from IKF; 1900-1913, E. F. Wagemann, *Economic Rhythm, A Theory of Business Cycles* (McGraw-Hill, 1930), pp. 266-68; 1924-38, *IKF Handbuch* 1933, p. 116 and 1936, p. 99; later data, IKF, *Statistik des In- und Auslands*, *passim*. Commodities included are scrap castings, scrap iron, scrap brass, lead, lumber, wool, hemp, flax, oxhides, calfskins.

equally large total fluctuations in both cases. Similarly, after 1923, the poststabilization adjustment in wage rates and their failure to decline during the 1925-26 contraction led to a huge wage-rate rise from 1924 to 1929, compared to mild changes in prices. After 1929 the cyclical downward adjustment of prices must have been accentuated by the depressing trends of largely noncyclical character that prevailed throughout the poststabilization years. Perhaps the most convincing evidence of the larger amplitude of wholesale prices is found during the years 1880 to 1913, when prices showed clear cyclical behavior and wage rates did not. In this as in other periods, the lesser amplitude of wage rates is not so apparent in expansions; it is most conspicuous in the failure of rates to respond, or respond promptly and significantly, to deteriorations in business conditions. The explanation for the weaker cyclical response of wage rates cannot be found in the long-term upward trend of these rates alone. At least during the last two or three decades before World War I there was a similar upward trend in the general price level. The cause must be sought rather in the determination of the price of labor and in the social forces which precluded purely "economic" adjustments in the labor market.⁶⁵

Turning Points, 1924-1939. Comparison of wage rates and prices can be carried through in greater detail on the basis of the monthly data presented in Appendix Table A-30 and Chart 22. Not only are the wholesale prices in these exhibits available at more frequent time intervals (monthly), but also their total coverage is substantially increased (four hundred commodities). The index is broken down into economically significant groups, such as prices for raw materials and semimanufactured goods versus prices of finished goods; controlled prices versus free prices or versus sensitive commodity prices; prices for producers' goods versus prices for consumers' goods. The cyclical behavior of wage rates will forthwith be compared with that of these price categories.

Chart 22 confirms the preliminary findings on conformity which were set forth in the previous section. All represented price series show clear cycles with a one-to-one correspondence to changes in general business conditions. They all experience actual declines during or close to business contractions. Wage rates are the only broad price group in which the reaction to the 1925-26 contraction consists of an interruption of growth only.

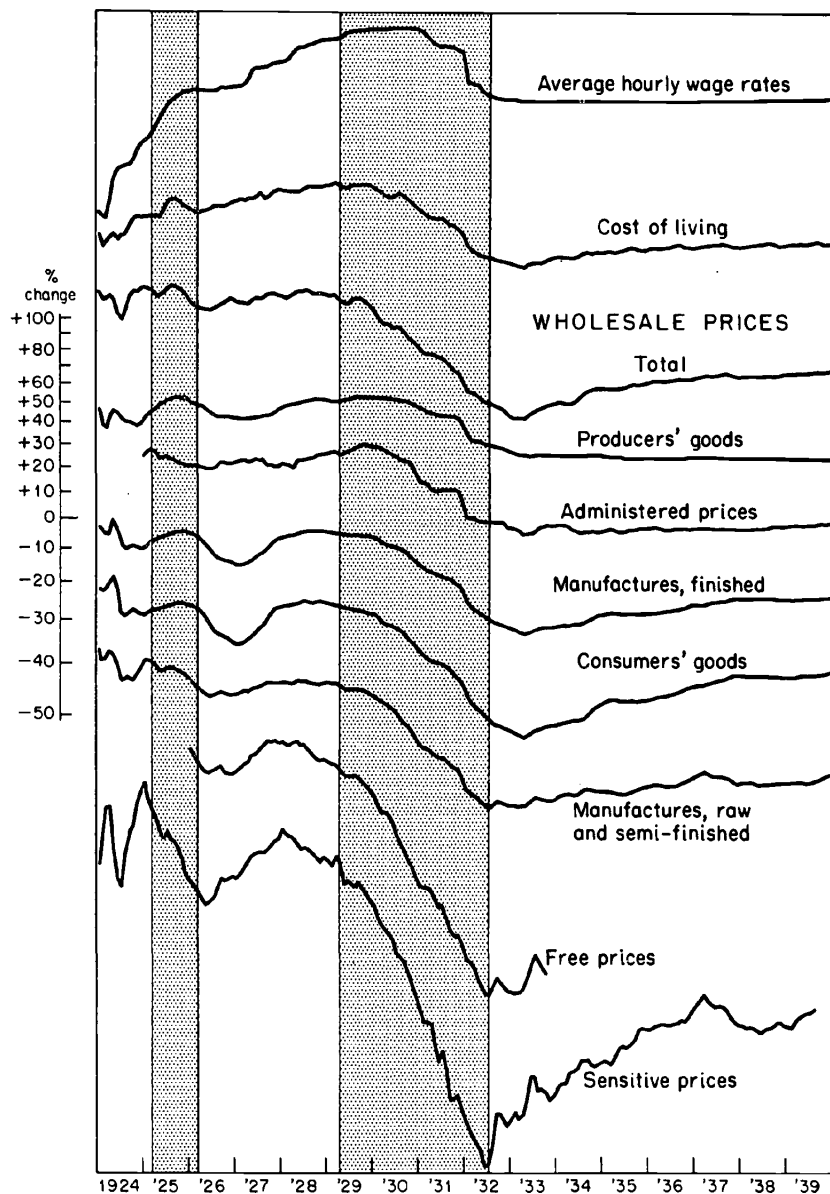
Table 41 relates the turning points of wage rates and prices to those in general business conditions.⁶⁶ The most impressive features of the table

⁶⁵ See Mitchell, *Business Cycles*, 1913, pp. 465-66.

⁶⁶ The comparisons are restricted to the four reference turning points in 1925, 1926, 1929, and 1932. The 1923-26 reference cycle is covered only in part, since wage series start in 1924 and some price series in 1925. Furthermore, the vehement short-term fluctuations of prices, in response to the stabilization problems of the year 1924, make it difficult to determine cyclical turning points during that year.

Neither wage rates nor the included prices showed enough seasonality to warrant adjustment.

CHART 22
Wages and Prices, 1924-1939



Shaded areas represent business contractions.

Source: Appendix Table A-30

TABLE 41

Timing of Cyclical Turning Points in Wage Rates and Prices, 1924-1932
(leads, —, and lags, +, in months)

	Peak March 1925	Trough March 1926	Peak April 1929	Trough August 1932
<i>Hourly Wage Rates</i> ^a	+8	+11	+13 +20	+8 +67
<i>Cost of Living</i>	+6	0	—1 ^b	+8
<i>Wholesale Prices</i>				
All commodities including farm products	+6	+3	—9	+8
Manufactures, raw and semi-finished	—1	+3	—11	—1
Manufactures, finished	+6	+11	—6	+8
Producers' goods	+6	+12	+5	+9 ^c
Consumers' goods	+7	+10	—5	+8
Sensitive prices	—2	+2	—15	—2
Free prices		+9	—15	—1
Administered prices	0	+3	+7	+8

^a The timing relations in this line are based on a number of special decisions. In 1925 and 1926, formation of a plateau was regarded as equivalent to a cyclical decline, and its initial and terminal edges as "turning points." The two entries for 1929 and again for 1932 represent the beginning and end of a peak ridge and a flat-bottomed trough. The extremely late upturn after the Great Depression is due to the wage stabilization under National Socialism. The 67-month lag stated above implies the end of the depression plateau to have been reached in March 1938. However, even this late turn marks but a slight change in the direction of wage trends. During the subsequent two years the rise in rates amounts to about 1 percent only.

^b This lead implies a peak of living costs in March 1929. This peak is brought about by a minor ripple. Alternatively, living costs might be held to form a peak plateau. At the initial and the terminal edge of this plateau the timing of living costs would be measured as —8 for P₁, and +8 for P₂.

^c Measured to beginning of trough plateau (T₁). End of plateau (T₂) occurs years later.

SOURCE: Appendix Table A-30.

are the consistent substantial lags of turning points in wage rates behind those of prices. In relation to reference turning points, this consistency reflects the long lag of wage rates behind changes in general business conditions, as compared to a much shorter lag of prices. The lags in wage rates vary from eight to twenty months, occur at each of the four major turns in business conditions, and are generally larger than those of any of the price series.⁶⁷ Although averages for observations derived from two cycles can hardly be taken to represent a "central tendency," they

⁶⁷ For the determination of turning points at the plateaus of 1925-26 and from 1929-30, see footnote to Table 41. Note that at the prosperity plateau around 1930 the lag of wage rates behind price turns exists whether the beginning (P₁) or the end (P₂) of the peak plateau is used as a basis of measurement. An extreme lag of 67 months is observed after the Great Depression and is due to wage stabilization under the Nazis. If this lag is omitted the range of lags is eight to twenty months.

serve to show that sensitive commodity prices lead, while administered prices (largely cartel prices) lag behind changes in business conditions. Similarly, wholesale prices of raw materials and semifinished goods tend to lead, while those of finished goods tend to lag. Somewhat unexpected is the situation in producers' and consumers' goods, particularly during the Great Depression. Both at their peak and at their trough consumers' goods prices show a considerably earlier reversal of direction than prices of producers' goods. At the peak this difference amounts to 10 months; at the trough it must be measured in years. The lead of consumers' goods prices requires explanation in view of the central role usually occupied by the markets for producers' goods in the turn of business fortunes. At the 1929 peak this lead was frequently regarded as a consequence of the limited capacity of the German consumers' goods market, which was easily glutted in periods of sustained prosperity. It reflected also the greater role of cartel agreements in the sphere of producers' goods, which might have led both to a better defense of effective prices and to a perpetuation of list prices long after price shading became the rule. The lag at the subsequent trough must be understood in terms of National Socialist price policies, to be discussed in the next chapter.

The difference in timing between wage rates and the price indexes presented here merits some comment. The signs of slackening or quickening pace of business conditions may be expected to appear in the demand-supply conditions of the product markets before production schedules and employment policies are actually adjusted.⁶⁸ That is, broadly speaking, labor market changes tend to lag behind product market changes. Furthermore, the frictions discussed in earlier sections of this chapter prevent prompt response of wage rates to changes in labor market conditions, while less effective frictions exist in price responses to changes in product market conditions. A case may be made out for the existence of an analogous set of frictions bearing on cartel-controlled prices. In this instance, agreements within the cartel and the establishment of industry-wide price lists correspond roughly to the collective agreements between unions and employers. The need to reach internal and external agreement on price revisions has delaying effects, corresponding in some ways to delays caused by the need for new collective agreements in the case of wage revisions.⁶⁹ The similarity between wages and cartel prices did not find expression in the timing of the specific turns in cartel prices at the 1925 and 1926 changes in business conditions. It did, however, lead to a delay in the downward revision of cartel prices at the 1929 peak, second

⁶⁸ In fact, such adjustments would characteristically be postponed until changes in the product markets are clear enough to warrant changes in managerial policy.

⁶⁹ It should perhaps be emphasized that cartel-controlled prices are here used as *pars pro toto*. Administered prices and tendencies toward nonprice competition existed also outside the sphere of formal cartel arrangements. For a systematic comparison of union wage rates and cartel prices see Wagenführ, "Kartellpreise und Tariflöhne im Konjunkturverlauf," pp. 501-17.

only to that of wage rates. This delay of seven months' duration behind the turn of general business conditions is all the more remarkable in view of the fact that the controlled prices were for raw materials and that the index of all raw materials and semifinished goods prices turned down eleven months before the reference-cycle peak. At the 1932 trough, the low in controlled prices lagged eight months behind the reference trough, compared with a one-month lead for all raw materials and semifinished articles. However, in this case, the eight-month lag of controlled prices was equaled and exceeded by other price categories.

Amplitudes, 1924-1933. We shall now compare the behavior of wage rates and prices in terms of their cyclical changes between reference turning points. Net annual changes of cycle relatives are presented in Appendix Table A-31. The table shows that wage rates were also sharply differentiated from other prices with regard to amplitudes, during both reference expansions and contractions. Between January 1924 and March 1925 wage rates rose appreciably more than the most volatile price series, that of ten sensitive commodity prices. The rise of wage rates amounted to about 25 percentage points, compared with a change of less than 1 percentage point in the wholesale price index for all commodities, and with a decline of about 3 percentage points in raw material prices. During the reference contraction from March 1925 to March 1926, wage rates rose countercyclically by 16 percentage points in the face of a moderately declining general wholesale price level. It is true that prices of finished manufactures (producers' as well as consumers' goods) also rose, but not by more than 2 percentage points. In the subsequent business expansion from March 1926 to April 1929, wage rates rose 18 percentage points, or 6 percentage points per year, about twice as fast as the most rapidly rising price series—sensitive commodity prices and living costs—and six times as fast as wholesale prices at large. Finally, during the Great Depression (measured from April 1929 to August 1932) wage rates declined less than all price series save one.⁷⁰ While the general wholesale price level dropped more than 33 percentage points, or 10 per year, the decline of wage rates kept within two thirds of this change.

In general the cyclical behavior of wage rates shows greater homogeneity than that of prices. This observation parallels the conclusions reached from the previous analysis of long-term trends in wage rates and prices. The greater homogeneity in the cyclical behavior of wages is reflected in the amplitudes of wage rates and prices during the reference cycle 1926-29-32. Table 42 presents the amplitudes of those four wage-rate series which—of

⁷⁰ The only major price group that declined less than wage rates was that of producers' goods—where prices are actually exposed to particularly strong downward pressures. However, the strong cartel organizations prevailing in the machinery field were able to limit the downward movement of this category. Note also the possibility of a greater diversion of list prices and effective prices in this group. The "normal" relation between amplitudes of producers' goods and consumers' goods prices has been described and explained by Mitchell, *Business Cycles*, 1913, pp. 462-64.

the seventeen reported industries—show the largest and the smallest increases and decreases during the two reference phases. The table also gives the amplitudes of several price series, selected to indicate the variation in price behavior. It is readily apparent that variations in amplitudes as large as those observed in the selected price series did not occur in wage rates.⁷¹ This is not to say that in all segments of the price system and among broad commodity groups price behavior is necessarily less homogeneous than wage behavior. It can be shown, however, that, as in the case of trends, the variations between different wage-rate series are of limited range. The extreme variations in cyclical behavior, which are frequently to be found in prices, are never present in wage rates.⁷²

TABLE 42
Amplitudes of Selected Wage Rates and Prices, 1926-1932

	CHANGE OF CYCLE RELATIVES DURING:	
	<i>Expansion</i> 1926-29	<i>Contraction</i> 1929-32
<i>Wage Rates</i>		
Papermaking	+20	-17
Building	+15	-31
Baking	+16	-15
Brewing	+21	-12
<i>Wholesale Prices</i>		
Raw materials		
Sugar	-11	+21
Hides and skins	+12	-77
Agricultural products		
Vegetables	-3	-11
Cattle	+5	-58
Industrial materials and semi-manufactures		
Lubricants	-9	-4
Rubber	-124	-81
Building materials	+10	-35
Industrial finished products		
Machinery	+6	-10
Furniture	+11	-40

SOURCE: Wage rates, amplitudes computed from Appendix Table A-22.

Prices, amplitudes computed from *IKF Sonderheft 37, passim*. For each commodity group, those goods whose prices showed extreme variation during the indicated cycle phase were selected.

⁷¹ The above comparisons are based on wages for skilled workers only, but the situation is not basically different for unskilled workers.

⁷² The differences between cyclical amplitudes in prices are due partly to trend factors, so that the great variability in cyclical behavior merely reflects that already found in trend behavior. But trend behavior cannot explain completely the differences in amplitudes, as we learn from a comparison of, say, sugar prices and hide prices, or of furniture prices and prices for industrial machinery. Here, amplitudes vary widely despite similarity in trends. No attempt has been made to distinguish between trend elements and other elements in the apparent cyclical behavior of prices and wages.

Wage Rates and Cost-Price Relationships. The deviation in the cyclical behavior of wage rates from that of other prices must have had important consequences for the relationship of cost and finished-product prices, and ultimately for the profitability of manufacturing enterprises. Chart 22 indicates the direction and extent of the resulting pressures. Prices for finished manufactures started to decline in October 1928, while wage rates continued to rise or to maintain their level until December 1930. True, industrial raw material prices declined during the same interval. On the other hand, prices paid by manufacturers for producers' goods remained virtually stable, and volume of production declined considerably. Between the peak of finished product prices (October 1928) and the last month of peak wage rates (P_2 , in December 1930) the percentage changes in the price, cost, and volume elements are shown below.⁷³

	<i>Percentage Change between October 1928 and December 1930</i>
Hourly wage rates	+5
Producers' goods prices	-3
Finished manufactured product prices	-11
Volume of industrial production	-15
Raw material and semifinished product prices	-18

The reported percentage changes can indicate the direction of certain cost-price pressures, but they cannot gauge their intensity or their effects on profitability. It should be remembered that the wage data themselves are minimum rates, and that the prices and wages here discussed form only a small portion of the elements that affect profitability. The maintenance of fixed and quasi-fixed costs may have had more impact on business fortunes than the disparity between sales prices and such variable cost elements as wage rates had.⁷⁴ Furthermore, the volume of producers' goods purchased by manufacturers decreased sharply during the contraction, so that the relatively high price level of these goods played a minor role in the total picture. Finally, the juxtaposition of finished goods prices as "sales prices," and raw materials plus semifinished product prices as "costs," is a gross simplification. For manufacturing and mining, as a whole, semifinished goods and raw materials are the end products of many enterprises, and conversely, finished products enter many establishments in the form of equipment or components, that is, as a cost element.

This last reservation can be overcome, however. In a number of

⁷³ The total specific decline of prices for finished manufactures was 30 percent; for raw materials 36 percent; for producers' goods only 19 percent; and the decline of wage rates was 22 percent.

Note that the percentage changes are here stated in the conventional way, i.e., they are measured from the initial date. This suffices for the present discussion, since the measures concern behavior during one contraction only. No direct comparisons are intended between amplitudes in expansion and contraction phases.

⁷⁴ Profits, because of their residual character and small size relative to revenues, are, of course, highly sensitive to even slight changes in major cost items.

CHART 23
Wages, Prices, and Production, Seven Industries, 1924-1934

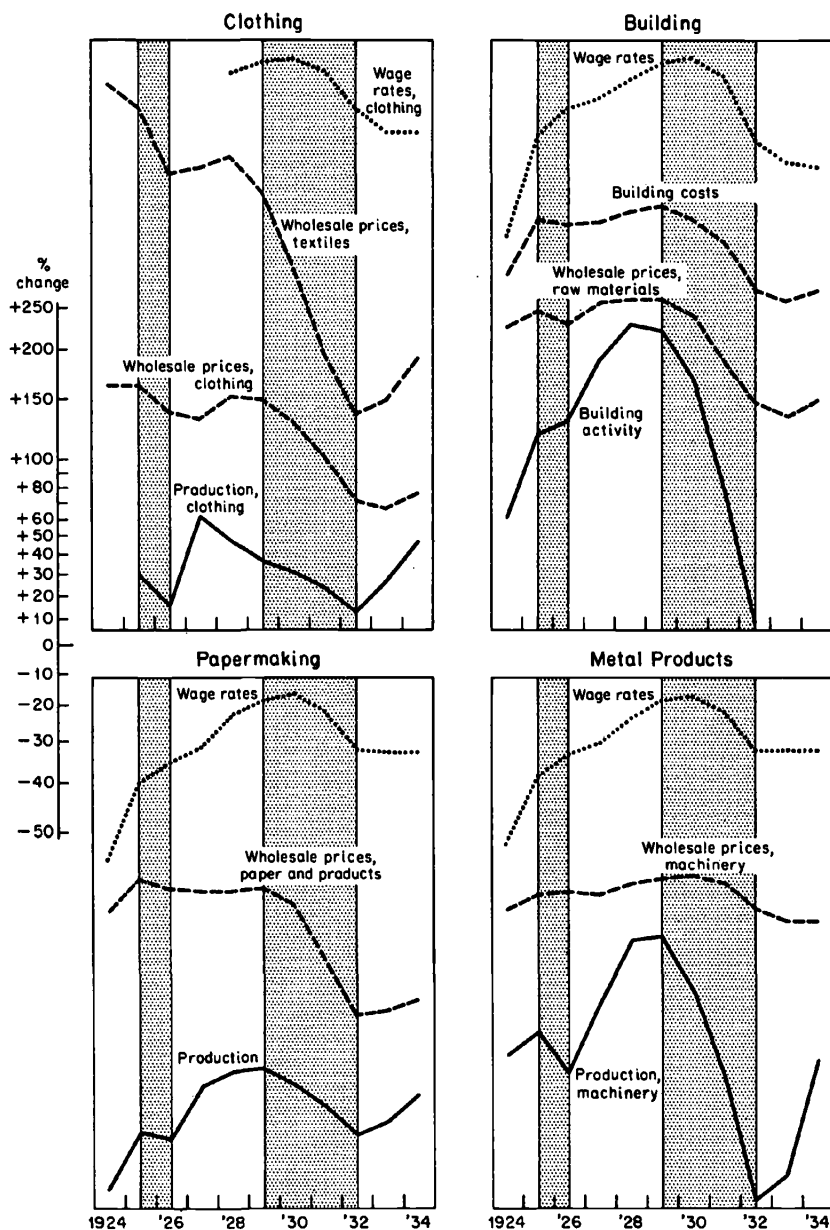
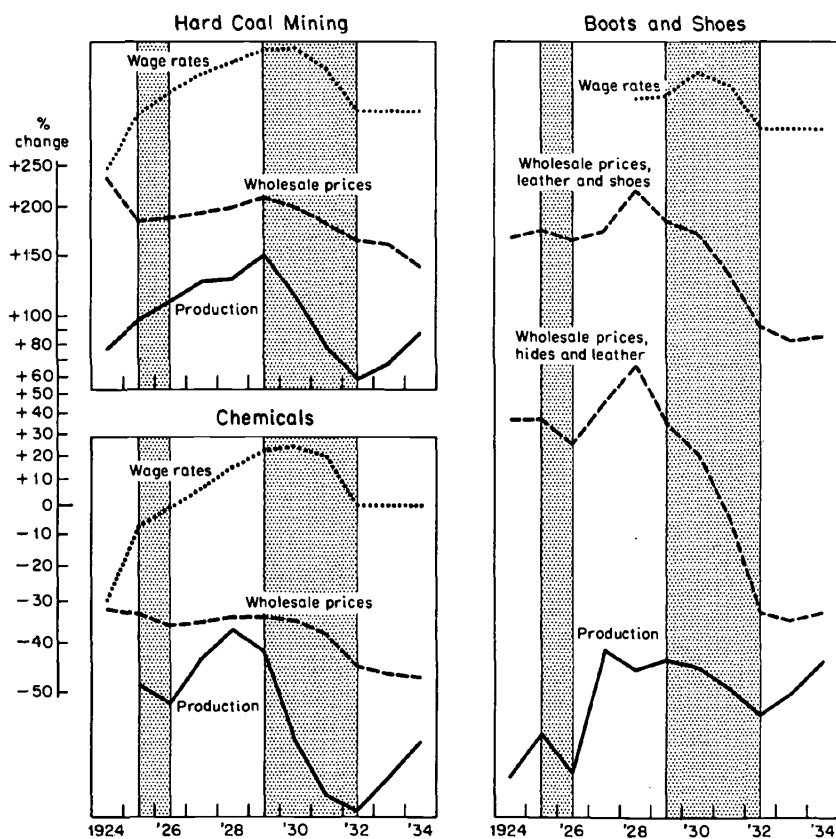


Chart 23 (Concl.)



Shaded areas represent business contractions.

Source: Appendix Table A-32.

industries, it is possible to distinguish prices for materials from those for end products. Also it can be shown that the price-cost differentials and their importance for profits must have varied considerably from industry to industry, depending on the cyclical behavior of prices, wages, sales volume, productivity, importance of fixed costs, and other factors. Appendix Table A-32 and Chart 23 contain price-cost comparisons and, wherever possible, production or employment information on an annual basis for the following industries: clothing, papermaking, boots and shoes, chemicals, hard-coal mining, building, and metal products. Common to all these industries, during the years 1924-29, was a steep rise in wage rates in the face of only slightly increasing, virtually stable, or actually falling finished product prices. The rise in wage rates coincided with a period when production trends were generally going up and relations between raw-material and finished-product prices were not unfavorable. In the course

of the Great Depression, prices of most finished products declined promptly, whereas in each industry wage rates reached their annual peaks only in 1930.

From industry to industry we find considerable variation in price-cost-production patterns. In clothing, for instance, the production peak was reached as early as 1927, in the hard-coal mining industry as late as 1929. Furthermore, while the basically competitive textile industry suffered price declines from 1928 on, the largely cartel-controlled metal products industry was able to maintain its controlled price levels until 1930. As compared with the great variety in the timing, amplitude, and pattern of prices and production in each of the industries covered, the patterns of wage rates were fairly similar. In the period 1924-29, wage rates went up—whether finished-product prices were rising (metal products), falling (chemicals), or stable (paper). And wage rates continued their rise through the year 1930, even where product prices had started to decline one, two, or three years earlier. All in all, during the postinflation period of the Weimar Republic, wage rates exhibited rather autonomous patterns with a considerable degree of family resemblance among themselves but at best mild modifications (see Chart 23) in response to the varied production and price movements in different industries. The greater homogeneity in behavior of wages as compared to prices may be traced to the exchangeability of skills, the thorough organization of the labor market, and last but not least, the effects of changes in living costs, which influence wage rates uniformly in all industries. By contrast, manufactured goods are exchangeable only to a limited extent, are highly differentiated with regard to cyclical fluctuations, and their prices are commonly not affected by considerations of the seller's welfare.

WAGE RATES AND LIVING COSTS

Prior to World War I. As pointed out in Chapter 2, trends of consumers-goods retail prices or cost-of-living indexes occupied an intermediate position between wage rates and wholesale prices.⁷⁵ This relation between the three measures characterizes also their cyclical behavior, as can be seen from Chart 6. The chart shows, however, that cost-of-living, wage-rate, and wholesale-price cycles are not always in correspondence. The period from 1871 to 1913, for instance, includes four specific cycles (increases and decreases) in living costs compared with one specific cycle in wage rates. There is closer correspondence between cycles in living costs and wholesale prices and, in fact, between these two measures and general

⁷⁵ The retail prices covered only food and rent, weighted approximately according to their importance for a typical worker's family. They are sometimes referred to as cost of living, although they do not cover all such expenditures. Comparison of the Kuczynski index with other food-cost or living-cost indexes (Chart 7) shows that the similarity of the various measures is greater in their trend than in their cyclical behavior. Thus the cyclical movements of the Kuczynski index are less "confirmed" and may be regarded as only a rough approximation of living-cost behavior.

business conditions. Even here, however, living costs may be viewed as showing two cycles during the *Gründerjahre*, whereas wholesale prices experienced only one cycle. The cyclicity of living costs expresses itself only in a leveling out of growth during the 1904-8 cycle, and it disappears entirely during the brief reference cycle of 1902-4. At the six turning points of living costs which can be matched with those in general business conditions, cost of living lagged behind reference turns in four cases, led in one, and coincided in the remaining instance.

To say that living costs followed an "intermediate" course between wage rates and wholesale prices is to generalize too broadly for purposes of the present chapter. During the *Gründerjahre* cycle, for instance, wage rate amplitudes exceeded those of living costs. From about 1880, the rate picture was dominated by the strong upward trend of wages, with the result that during business expansions the rise of wage rates tended to exceed that of living costs. And during matchable contractions, cost of living declined while wage rates increased or leveled off.

1924-1933. Substantially better information on the cyclical behavior of wage rates and living costs can be obtained for the poststabilization years. The comprehensive index of union wage rates and an official cost-of-living index covering all major expenditure groups are available by monthly intervals. The basic data are contained in Appendix Tables A-30 and A-33, and the timing relations and amplitudes during reference cycles are shown in Table 41 and Appendix Table A-31. From these exhibits we observe that at two of four reference turning points (March 1925 and August 1932) living costs lagged, at one (March 1926) they coincided, and at one (April 1929) they led. The lead in the last case, however, amounts to one month only and is brought about by a random departure from a level which extends for another eight months after the reference turn. If the end of this plateau (P_2) were regarded as a turning point, we should establish lags in three cases and coincidence in one. Cost-of-living indexes at each turning point reversed their direction earlier than wage rates, with an average lead of about a half-year.

During the two interwar cycles, living costs increased less in expansions and decreased more in contractions than wage rates did. This finding applies whether their amplitudes are measured in terms of reference or of specific cycles, except for the brief 1925-26 reference contraction, when wage rates and living costs continued their specific rises. The monthly observations for the interwar period thus confirm the impressions derived from annual data for the pre-1913 era. However, during the Kaiserreich the cyclical behavior of wage rates and living costs could be explained largely in terms of the strong secular upward trends in wages. Such trends are not apparent for the interwar period, because it was so brief and was characterized by strong cyclical fluctuations. The amplitude measures describe net changes between reference or specific turning points only. They offer no information on the behavior of wages or living costs during

intermediate cyclical stages. As Chart 22 shows, during the phase of drastic wage rate reduction, from the end of 1930 to the beginning of 1932, wage rates actually declined more than cost of living.

Up to this point the investigation of cycles in wages and in living costs has been carried through in terms of comparative price behavior. Hence the presentation has been restricted to living costs and wage rates proper. Still to be examined are the effects of the disparate cyclical movements of wage rates and prices upon the purchasing power of wages—in other words, the cyclical behavior of “real wages.”

Cycles in Real Wages

REAL WAGES AND TURNING POINTS IN BUSINESS CYCLES

Real Wage Cycles

BEFORE WORLD WAR I. The wage-price quotient, which gives us real wages, cannot be expected to record changes in the total economic well-being of workers, since neither all working conditions nor all living-cost elements find reflection in this measure. However, even the purchasing power of the income at the worker's disposal is not adequately described by real earnings. Income from other sources, changes in size of family, the employment and earning status of other family members all codetermine the volume of goods and services available to the individual wage earner. Although the changing purchasing power of average family income is probably the most adequate gauge of economic well-being, it is difficult, from the data at hand, to make a close measurement.⁷⁶ The present aim, therefore, is to follow the course of money and real wages of employed workers, and only incidentally to consider other determinants of their economic welfare. Thus, the following real-wage analysis will deal primarily with cyclical fluctuations in the purchasing power of rates and earnings of employed workers.

Hourly real rates of building and printing workers are presented in Appendix Tables A-12 and Chart 8. The outstanding feature here is the relatively high inverse conformity to business cycles. Particularly during the long cycles in the nineteenth century, specific cycles in real rates for building and printing can be matched fairly easily with business cycles at large. But the real-rate declines (or pauses in growth) occur for the most part during expansions in general business activity, and the real-rate increases during business cycle contractions. For printing rates, the cyclical character of real wages is more pronounced than that of money wages. The apparent inverse conformity as well as the more pronounced cyclical swings of these real-wage series must be explained by the combination of two sets of facts. First, money wage rates during the years

⁷⁶ Jürgen Kuczynski's "real net wages" represent an attempt to estimate per capita working-class income of both employed and unemployed. This estimate is, of course, only indirectly related to the concept of average family income. See, for instance, his *Germany, 1800 to the Present Day*, pp. 133-38.

1872-82 showed long lags and thus moved counter to general business fluctuations. In subsequent years they increased in expansions but showed little or no decline in contractions. Second, during business contractions, living costs tended actually to decline in the face of slightly rising or stable rates. The result is the inverse conformity we have observed.

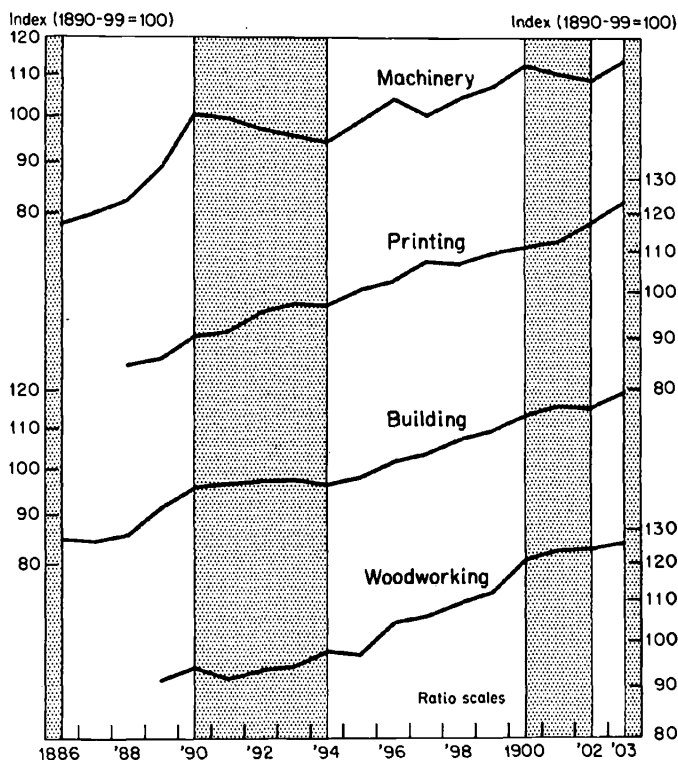
TABLE 43
Effective Hourly Real Wage Rates, Four Industries, 1886-1903
(1890-1899 = 100)

<i>Year</i>	<i>Building</i>	<i>Machinery</i>	<i>Printing</i>	<i>Wood</i>	<i>Average, Four Industries</i>
1886	93	86	...	...	90
1887	93	88	...	...	91
1888	91	88	90	...	90
1889	93	91	88	93	91
1890	95	99	90	93	94
1891	94	97	89	89	92
1892	95	95	94	92	94
1893	97	95	97	94	96
1894	97	95	98	99	97
1895	100	101	103	99	101
1896	104	107	106	108	106
1897	104	101	109	107	105
1898	105	102	105	107	105
1899	107	105	107	109	107
1900	110	109	108	117	111
1901	111	106	108	119	111
1902	109	103	112	118	111
1903	113	108	117	120	114

SOURCE: Based on wage rates (actually paid rates, taken from payroll records) from Table 33, and on cost of living from Appendix Table A-11.

In view of the striking character of the finding that contractions in business activity tended to bring about improved real rates (and that prosperity brought declines in these rates), further evidence should be adduced. Accordingly, real wage rates for building, machinery, printing, and woodworking were computed (see Table 43 and Chart 24). The basic money rates, unlike the long-term series at our disposal, were ascertained directly from factory payrolls. From them we learn that the real rates in the machinery industry rose during business expansions and declined during contractions. In the other industries real wage rates tended to rise during both expansions and contractions of business. The rise during expansions, however, was considerably larger than during contractions. Thus, the evidence examined for this particular period does not confirm the inverse relation shown by the longer series on nominal rates in building

CHART 24
Effective Hourly Real Wage Rates, Four Industries, 1886-1903



Shaded areas represent business contractions.

Source: Table 43.

and printing. Nevertheless, insofar as our evidence goes, a decline in real wage rates during business contractions does not appear to be typical of the cycles before World War I.

Positive conformity of wages to business cycles before World War I is more clearly apparent in the case of earnings. Appendix Table A-12 and Chart 8 record real shift earnings of underground and surface miners in Dortmund's hard coal mines, and earning averages for ten coal, ore, and salt mining districts. A high degree of positive conformity emerges from these data. The only elements preventing technically "perfect" conformity consist in the occasional skipping of brief mild cycles, such as that from 1902 to 1904. Conformity of this high order is not, however, to be found in other real earnings series. Appendix Table A-12 shows that the specific cycles in average daily real earnings of Krupp metals' workers and of railroad workers did not correspond in any regular fashion to the fluctuations in general business conditions. In some cases where the money-wage decline was sharp, it appears also in real wages (see, for instance,

the 1875-80 and 1900-1902 declines in Krupp earnings). But in most cases the pre-1913 fluctuations in money earnings were mild, and often compensated or even overcompensated by changes in living costs.

INTERWAR CYCLES. Broad annual indexes of hourly real rates, and hourly and weekly real earnings, are computed in Appendix Table A-13 and presented graphically in Chart 9. On these indexes we may make the following observations: The 1925-26 contraction is skipped by all the annual real wage measures. The subsequent cycle, embracing the Weimar period of prosperity and depression, is clearly reflected in all series. During the Great Depression, hourly and weekly real earnings showed actual declines. There was a net increase between 1929 and 1932 in hourly real rates, but the gain was considerably smaller than that experienced in the preceding reference expansion, and it occurred despite a specific decline after 1931. To the extent that cycle phases can be matched, we find positive conformity of real wage cycles and business cycles, and no evidence at all of an inverse relationship.

Hourly real union rates, by months, are derived in Table 44 and depicted in Chart 14. During the reference contraction of March 1925 to

TABLE 44
Hourly Real Union Rates, by Months, 1924-1933
(1928 = 100)

	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933
Month										
Jan.	65.9	79.8	92.9	91.3	96.1	101.9	106.6	114.7	107.6	108.9
Feb.	68.5	80.5	93.7	91.0	96.5	101.3	107.4	114.6	109.9	109.5
Mar.	66.8	82.4	94.1	92.1	97.2	100.4	108.7	114.5	110.0	109.3
Apr.	69.6	84.1	93.4	93.1	99.6	102.9	109.8	112.7	110.9	109.4
May	73.7	86.8	93.3	96.1	101.6	104.8	110.4	112.2	108.8	107.9
June	79.1	87.1	92.6	95.9	101.1	105.2	110.0	111.6	107.4	107.3
July	78.0	85.4	91.7	94.5	100.6	104.6	108.8	111.7	107.0	107.3
Aug.	78.3	86.3	91.7	96.7	100.5	104.9	109.0	113.4	108.0	107.5
Sept.	76.9	87.2	92.9	96.4	101.0	105.0	110.3	113.8	107.9	106.9
Oct.	75.0	88.8	92.7	95.6	101.9	105.0	111.4	113.8	107.8	106.1
Nov.	76.8	91.3	91.8	95.8	101.9	105.1	112.7	114.0	107.9	105.4
Dec.	78.8	91.6	91.5	95.4	101.9	105.7	114.1	114.6	108.1	105.0
Average	73.9	85.9	92.7	94.5	100.0	103.9	109.9	113.5	108.4	107.5

SOURCE: Based on wage rates from Table 34 and cost of living as given in Appendix Table A-33, (shifted to 1928 = 100).

March 1926, and during most of the Great Depression, real wage rates did not decline. Nevertheless real wage rates may be regarded as conforming positively to the general business cycle. This statement assumes matching of the wage declines beginning March 1926 and April 1931 (or January 1932) with the proximate business contraction, despite the

fact that the long delay in real wage responses places the first decline wholly within the succeeding reference expansion, and the second decline partly within it.

In view of the predominant evidence on positive conformity of real wage rates in years for which satisfactory information is available, the question arises whether the earlier indication of inverse conformity does not reflect shortcomings of the data. The issue cannot be resolved with certainty, since reliable evidence is scarce. Yet it appears plausible that, during periods of rising wages and relatively low unemployment, workers (especially those in the better organized industries) may have been able to maintain their rates during contractions even in the face of falling retail price levels. That such a situation, leading to increased real rates during contractions, existed in the printing trades seems quite certain. During the later interwar period, in any case, the wide amplitudes of cyclical fluctuations in all money wages forced real wages into positive conformity.

The Lagging of Real Wage Turns. The annual character, the small coverage, and the unreliability of cost-of-living information for the years prior to World War I render the task of establishing timing relations for this period one of doubtful worth. The following observations on timing, therefore, will be based exclusively on wage information for the interwar period.

The comprehensive annual data are found in Appendix Table A-13 and Chart 9. Even for this period, only one turning point can be investigated for all available comprehensive series.⁷⁷ The decisive difference between the timing of real wages and money wages is the tendency of real wages to lag further in cyclical response. The same cannot be observed for weekly earnings, in which turning points of money and real wages coincide. But hourly real rates and average hourly real earnings have their specific peaks in 1931—two years after the turn of general business activity and one or two years after the turn of the corresponding money wage series. The tendency toward a longer lag in real wages as compared with money wages appears also, to some extent, in the timing of the subsequent recovery. Hourly money rates, for instance, reached their low (T_1) in 1933, stabilized at this level, and resumed a slow increase only with the outbreak of World War II; by contrast, hourly real rates continued their decline from 1931 to the very end of the Reich's existence. Average hourly money earnings had their trough in 1933, whereas average hourly real earnings maintained their depression levels until 1935.

For hourly wage rates the timing relations can be studied also on the basis of monthly information. The tendency toward an increased lag can be observed in the reaction to the 1925-26 contraction. The leveling out of money wages (P_1) started in November 1925—that is, eight months

⁷⁷ All series start with 1924, the first poststabilization year, and move up to their specific peak at or after 1929. They all reflect the Great Depression, but some do not show clear upturns thereafter.

after the reference peak. The upper turning point of real rates, on the other hand, occurred in March 1926—that is, twelve months after the reference peak and in fact coincided with the reference trough. The subsequent specific recovery came in February 1927, both for money⁷⁸ and for real rates. The coincidence is brought about by the sharp steplike upswing in money rates. The long lag in real rates appears most clearly in the response of wage rates to the onset of the Great Depression. While at that point the lag in money rates extended to thirteen or twenty months, the lag in real rates lasted twenty-one, twenty-three, or even thirty-two months—depending upon the determination of the peak.⁷⁹ Chart 14 shows how, during the year 1931, money rates experienced significant declines while real rates continued, with minor fluctuations, to hover close to their peak position until the very end of the year.

Shift earnings of coal miners provide us with material for a quarterly comparison of money and real wages, as presented in Appendix Tables A-25 and A-34, and Charts 16 and 25. In the Great Depression, real earnings of hard-coal miners turned upward three to six quarters later than the corresponding money wages. At various dates in 1931, strong cuts in miners' money wages caused temporary declines of real wages. However, the stabilization or slow recovery of money wages by the first quarter of 1932—in the face of further declines in cost of living—brought about renewed increases in real earnings in all four series up to the first quarter of 1933. At that time cost of living began to rise and—in connection with the government's policy of wage stabilization—led to a leveling-out or slow decline in miners' real earnings.⁸⁰

AMPLITUDES OF REAL WAGES

Generally amplitudes of real wages are smaller than those of money wages. This is true of rates as well as earnings, and of reference as well as specific cycles. The extent of the difference is described in this section, which again will be based mainly on data covering the interwar years 1924-33, and only occasionally on some earlier or later evidence.

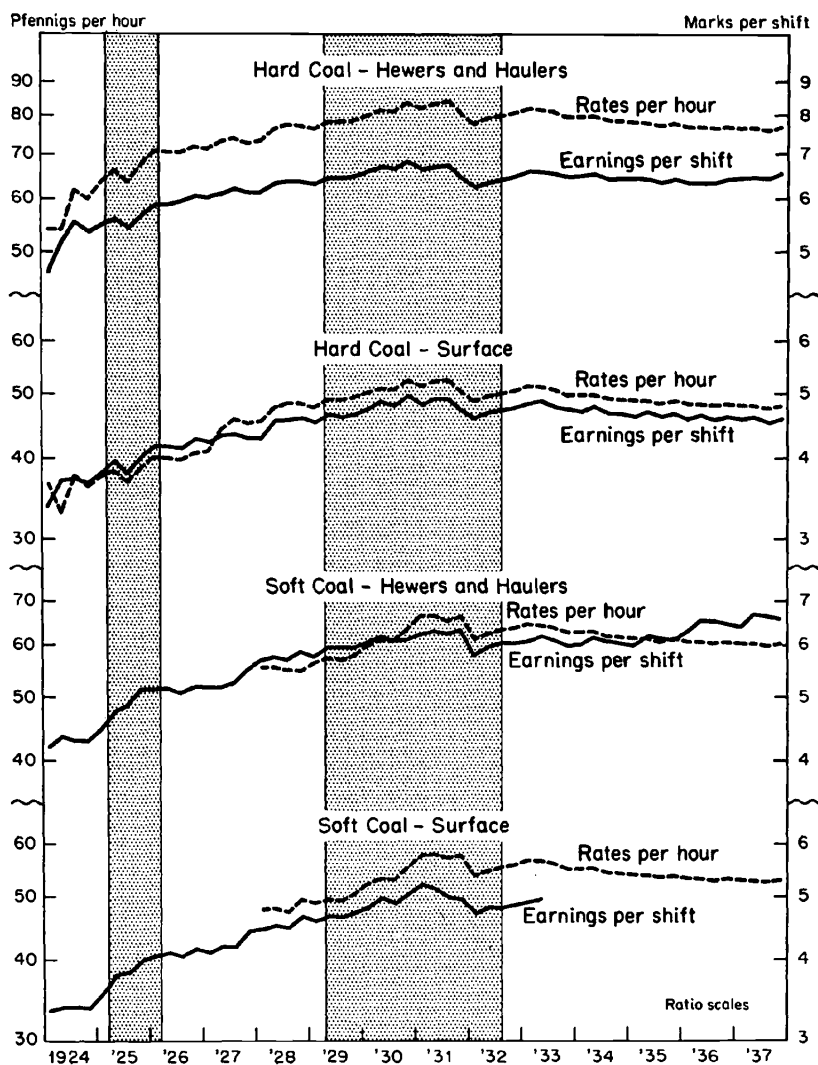
For the broad annual indexes of hourly wage rates and of hourly and weekly earnings, amplitudes of money wages and real wages during reference expansions and contractions are shown in Table 45. During all reference cycle phases and for each wage type, real wages fluctuated less than money wages. This is owing, of course, to the positive conformity and good timing correspondence of cost-of-living changes with fluctuations

⁷⁸ The end of the plateau in money wages was considered as a lower turn (T_2).

⁷⁹ The peak could be chosen at the beginning of the plateau (P_1 , January 1930) or at the end (P_2 , March 1931), or even at the alternate peak in December 1931.

⁸⁰ There are basically similar relationships between quarterly money-wage rates and real-wage rates in German coal mines. The resemblance of rates and earnings cycles in coal mining was demonstrated in Chart 16. Hard coal miners' money-wage rates form a plateau rather than a clear peak. The lags of real wages behind the initial edges (P_1) of the money-wage plateaus were eight quarters, those behind the terminal edges (P_2) three quarters.

CHART 25
Real Wage Rates and Earnings of Coal Miners, Reich Area, 1924-1937



Shaded areas represent business contractions, in terms of monthly chronology.
Source: Appendix Table A-34 and its sources.

TABLE 45
Amplitudes of Money and Real Wages,
1924-1932

	CHANGES OF CYCLE RELATIVES			
	1924-25	1925-26	1926-29	1929-32
<i>Money Wages</i>				
Hourly rates, monthly	+25 ^a	+16	+18	-20
Hourly rates, annual	+22	+9	+19	-20
Hourly earnings, annual	+25	+7	+25	-27
Weekly earnings, annual	+29	+5	+28	-38
<i>Real Wages</i>				
Hourly rates, monthly	+19 ^a	+14	+9	+4
Hourly rates, annual	+14	+8	+11	+4
Hourly earnings, annual	+18	+6	+17	-4
Weekly earnings, annual	+21	+4	+20	+16

^a Based on incomplete cycle; data start January 1924, reference cycle trough dated November 1923.

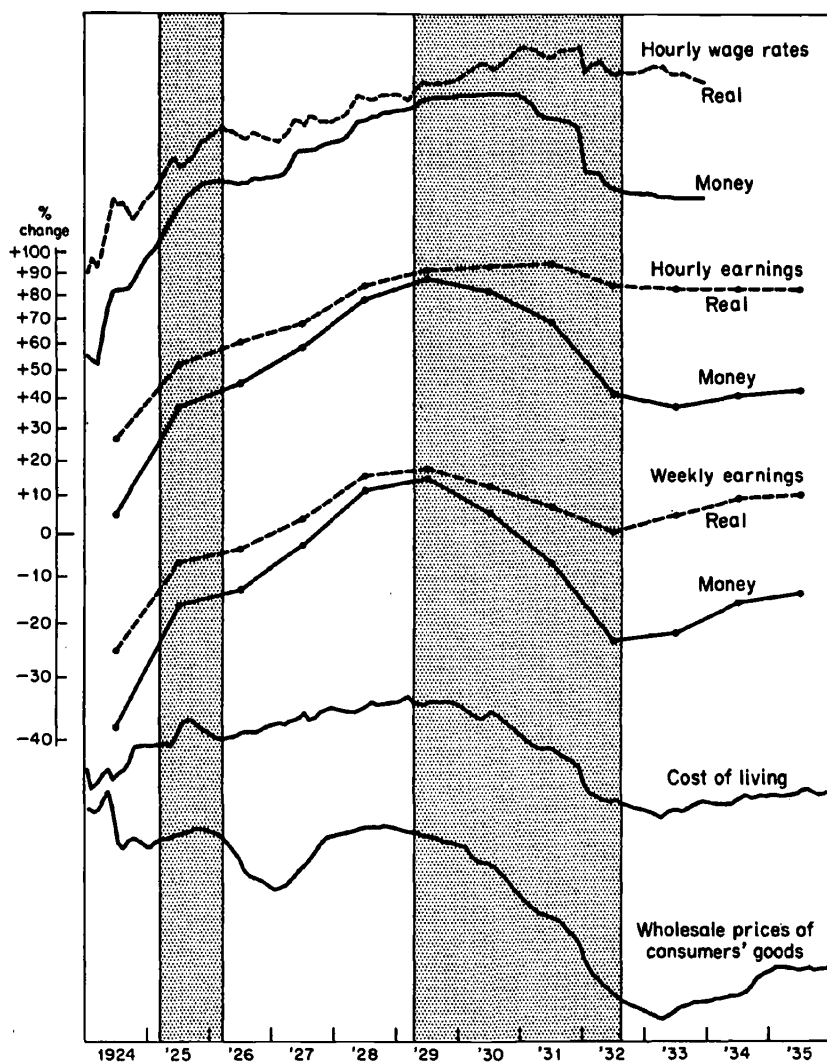
SOURCE: Money wages, Appendix Tables A-20, A-22, and A-23; Real wages, computed from Appendix Table A-13 and Table 44.

in general business activity. In one case, that of hourly rates during the Great Depression, the movements of money and real wages diverged⁸¹, hourly real rates showing a small increase with money rates declining about one-fifth. Between 1924 and 1929, money wages as well as real wages showed net increases between all reference turning points. In the case of real wage rates this is true even for the period 1924-32. Since the deflator used in the derivation of real wages is the same in all wage forms, it follows that the order in the amplitudes of the three money-wage measures and the three real-wage measures is similar. That is, hourly rates exhibit the narrowest, and weekly earnings the widest swings. This generalization is not invalidated by the fact that, during the 1925-26 reference contraction, increases in hourly rates were largest, and those in weekly earnings smallest; in terms of deceleration of growth, hourly rates still exhibit the least, and weekly earnings the strongest, cyclical response.

The availability of hourly real wage rates by months makes it possible to describe the differences between the monthly and the annual measures. Table 45 shows that both annual and monthly real wage rates rose during all reference cycle phases. Little regularity is to be noted in the relation of the amplitudes of annual and monthly data. Nor do the monthly data show consistently larger percentage changes during reference expansions, or greater deceleration during contractions. The wide variation between

⁸¹ This is the one important case compatible with Keynes' expectation that money and real wage levels would follow different cyclical directions. In all other cases the net changes of monthly wage rates between reference turning points move in the same direction. See John Maynard Keynes, *The General Theory of Employment, Interest, and Money* (Harcourt, Brace, 1936), p. 10.

CHART 26
Wages, and Prices of Consumers' Goods, 1924-1935



Shaded areas represent business contractions.

Source: Tables 34 and 44; Appendix Tables A-2, A-13, and A-30.

monthly and annual reference turns and the substantial lags of real rates are responsible for this irregularity. The table serves to emphasize the possibility of large and unpredictable differences among cyclical amplitudes derived from annual and monthly data.

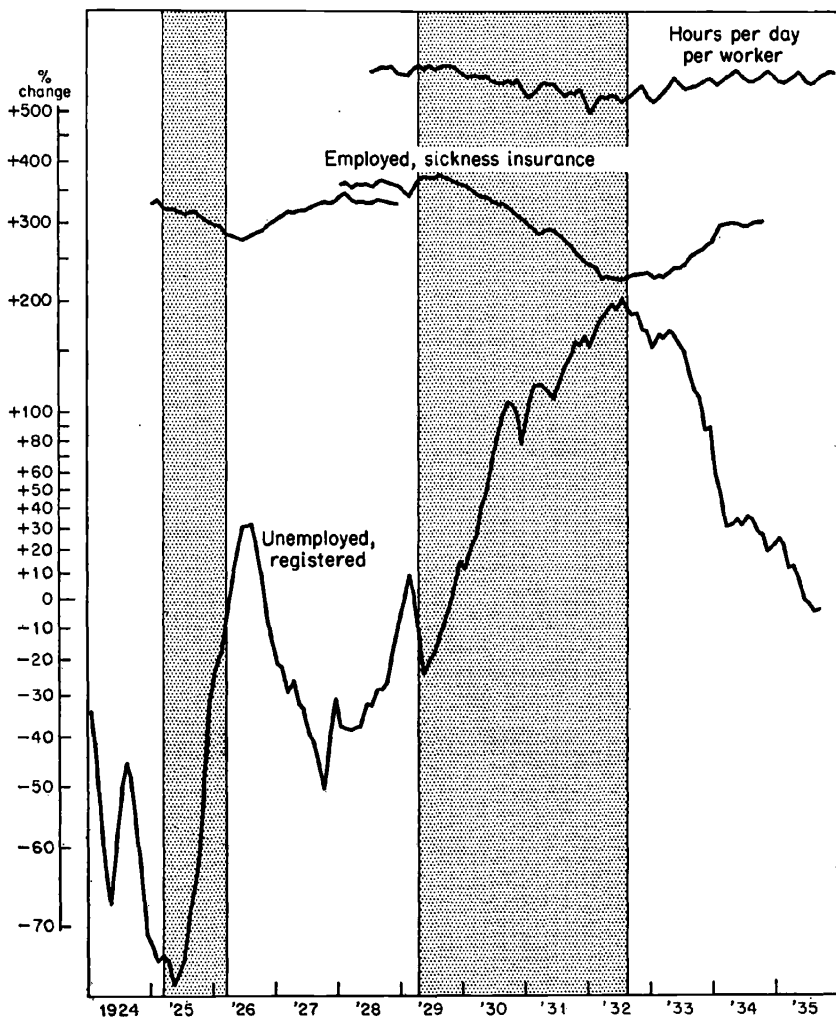
Money Wages and Real Wages during the Great Depression

The cyclical behavior of money wages, the fluctuations of prices and living costs, and the resultant changes in real wages have been treated in some detail. It is desirable now to review the interplay of these trends as it unfolds in the course of the business cycle. To this end we shall analyze labor market conditions and wage behavior during the Great Depression, a period for which the salient cyclical changes can be examined on the basis of fairly abundant data. Charts 26 and 27 provide a synopsis of the major labor-market and wage developments throughout the years 1924-35. It will be observed that average earnings must be appraised on the basis of annual information.

According to the chronology established by the National Bureau, the turning point marking the onset of the Great Depression for the German economy occurred in April, 1929. But long before that date, changes in labor market conditions and price levels occurred that had a decisive bearing on wage developments. The number of unemployed workers registered at employment exchanges, for instance, started to increase from the autumn of 1927. This early increase cannot be regarded as entirely "cyclical"; it is to be traced at least in part to the widespread introduction of laborsaving devices in the course of the "rationalization" of German industry.⁸² On the other hand, the unemployment resulting from the rationalization had consequences for the labor market as well as for consumers' goods markets, and constitutes an important aspect of the depression. In October 1928, consumers' goods prices at wholesale began to fall. This drop was related to the widespread—indeed international—decline in agricultural and other raw-material prices, but it also reflected the limited capacity of the German consumers' goods market, which shrank still more with the spread of unemployment. Whatever the causes of the cyclical turn in these prices, the effects of their decline on living costs appeared soon: consumers' prices at retail, as measured by the cost-of-living index, stopped their rise in March 1929, and up to the end of that year moved on a plateau slightly lower than their peak levels. A peak ridge of brief duration was reached also by employment during that year. Aggregate employment, seasonally adjusted, attained peak levels about April or May 1929, and almost maintained them until August—that is,

⁸² National Industrial Conference Board, *Rationalization of German Industry* (New York, 1931). See particularly the tables on pp. 172-75, for data on increasing output per worker.

CHART 27
Employment Indicators, 1924-1935



Shaded areas represent business contractions.

Source: Appendix Table A-28 and its sources; for hours see *IKF Handbuch*, 1936, p. 32.

for about four months after the date selected as the reference turning point. Average hours worked per worker per day reached their peak level at the month of the reference turn (April) and maintained it for a considerable time, in fact, until November of that year. Thus it was possible that, up to the fall of 1929, total labor input, in hours, held up relatively well, although registered unemployment (excluding its seasonal component) came close to two million workers.

The cyclical reaction of wages to deteriorating labor market conditions occurred first in earnings. The date of this reaction cannot be determined precisely. We know that, on an annual basis, average weekly and hourly money earnings as well as weekly real earnings reached their peak in 1929, but we have to guess at their intra-annual movements. Quarterly shift earnings in coal mines reached their peak in the fourth quarter of the year, together with a peak in coal output and employment. This makes it appear plausible that earnings for industry as a whole also reached their peak together with employment and average hours—that is, decidedly after the reference turn and probably during the latter part of the year. Throughout 1929 wage rates kept rising, with the most conspicuous though small upward step occurring after the reference contraction had set in.

After 1929, average weekly earnings decreased drastically and continuously. Between the years 1929 and 1932, the decline was 33 percent of the peak level, or 11 percentage points sharper than that of living costs. Consequently, average weekly real earnings declined also throughout the reference contraction, although, of course, at a lesser rate than money earnings. The situation was somewhat different in the case of average hourly earnings. The decline of the latter was milder between 1929 and 1931 than the drop in living costs, so that hourly real earnings continued to rise throughout these years. The mild decline in wage rates contributed, of course, to the situation. Between 1931 and 1932 the revisions in rates and the reductions in average hours worked per employed worker also forced average weekly real earnings into a cyclical decline.

Wage rates, as set down in collective agreements, were the last to give way to labor-market pressures. On an annual basis, money wage rates continued to climb up to 1930; on a monthly basis, they maintained peak plateau levels to the end of that year. It is known that during 1930 there was a systematic reduction of voluntary payments in excess of union rates, and that this reduction is not reflected in the published minima. But the labor-cost savings derived in that manner were rather limited, and by the end of the year there were already strong pressures toward the reduction of the wage minima themselves. The force of these pressures may be deduced from the following facts: by December of 1930 unemployment had mounted to 34 percent of all union members, and part-time unemployment to 21 percent. Employment had dropped 10 percent from peak levels, average hours worked per day 8 percent, and industrial production 11 percent. On the other hand, the reduction of living costs, coupled with the mild

risks or stability of money wage rates, had brought about an increase in real wage rates of 11 percent since the reference turn of April 1929. Thus, by the end of 1930, the need for cost cutting had become acute; there was little possibility of cutting labor costs further by reducing payments above minimum rates; growing unemployment had seriously weakened the competitive position of the workers; and the decline in living costs had mitigated the effect of rate cuts upon real income.

Only as a joint effect of these circumstances, aided by the pressure of compulsory arbitration awards, were minimum wage rates finally forced down. In this connection, let it be restated that their total decline during the year 1931 amounted to 8 percent. The fourth emergency decree of December 1931 brought a sizable downward adjustment in rates (10 percent). The decline of money wage rates continued throughout 1932, and in fact into the spring of 1933. During that phase, living costs were reduced also. The respective net declines of wage rates and living costs in the course of 1931 were about equal, with the consequence that hourly real wage rates in December 1931 returned (after a temporary drop) to the peak level they had reached during the first quarter of that year. The cut by emergency decree in the money wage rate and the subsequent adjustments finally forced real rates down too, but their total decline, until the advent of National Socialism, amounted only to 10 percent.

In the course of the year 1932 there were some signs of revival in the economy at large, and in the labor market in particular. Average hours worked picked up first, near the beginning of the year. About the middle of the year, employment (after allowance for seasonal factors) began to rise, registered unemployment passed its peak, and industrial output started to recover. Within the labor market the turn in cyclical fortunes was clearly observable. Reference revival is dated by the National Bureau at August 1932. On an annual basis, the recovery immediately pulled up weekly money and real earnings, and because of the continuing decline in living costs, the recovery of real earnings was even greater than that of money earnings. Hourly money earnings reached their low in 1933, and rose slowly thereafter. Hourly real earnings, which also declined to a low in 1933, maintained their trough levels through 1936. The reason for the late turn of hourly wages is found in the continued decline of rates, while the flat-bottomed trough of hourly real earnings is to be explained by the rise of consumers' goods prices and living costs from April 1933 on. As at the onset of the Great Depression, wage rates were the last to respond to changing business conditions. Trough levels were reached in March 1933, and maintained for many years. The concomitant increase in living costs led to twelve years of real rate decline. After March 1933, however, wage changes were controlled by National Socialist economic policies. Since they do not illustrate normal cyclical conditions, they will be considered separately in the following chapter, which is devoted to wage behavior during unusual episodes in the Reich's history.